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ABSTRACT

This mathematics handbook is designed for Adult Basic Education (ABE) teachers in order to strengthen their teaching skills in mathematics. Sections include: ABE mathematics scope and sequence charts, characteristics of the adult learners, explanations of math terminology, symbols, tables of measures, and an ABE mathematics assessment instrument developed for use with this handbook. Sets, numbers and numerals, counting, whole numbers, denominate numbers, fractions, and decimals are treated separately. Several activities for Levels I and II of difficulty are presented for each skill. Competency at the early levels of the sequence is felt to be more desirable than overall simple familiarity with the complete sequence. A bibliography is included. (MP)

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Gift

GOOD IDEAS FOR TEACHING

mathematics

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ADULT BASIC EDUCATION
ALABAMA

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MATHEMATICS

ALABAMA STATE DEPARTMENT
OF
EDUCATION

Montgomery, Alabama

Dr. LeRoy Brown
State Superintendent of Education

Dr. J.C. Blair, Director
Division of Instruction

Mr. Norman O. Parker
State Coordinator
Adult Basic Education

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PREFACE

Nation-wide there is as much concern over the improvement of mathematics programs as there is in any other single area of the curriculum. Daily life in the latter third of the twentieth century requires at least a basic understanding of fundamental concepts and operations of mathematics in order to cope with the demands of our rapidly changing technological social order. No one will be able to participate fully in this dynamic society without the skills and attitudes necessary to perform basic mathematical operations.

The success of any effort to improve the mathematical skills of adults depends in large measure on whether adult education programs continue to improve their total mathematics program through a continuous progress approach to mathematical understandings. This handbook, GIFT, is intended to enhance continuity in learning from level to level, to broaden the range of skills taught, and to develop interest in mathematics beyond demands of everyday assignments within the program. Cooperative planning and cooperative teaching are essential to solving these problems.

Adults at all ages and ability levels can engage in critical thinking. Imagination and the ability to manipulate mathematical symbols are needed if the learner is to develop to the "full limits of his capability."

The basic objective of this handbook, GIFT, is the presentation of guidelines, procedures, and techniques for teaching basic mathematics to adults. The handbook is directed primarily at the practicing Adult Basic Education teachers.

Robert K. Leigh
Professor of Education
University of Alabama

ACKNOWLEDGMENT

A group of educators representing all areas of the state were chosen to develop a mathematics handbook designed to strengthen the teaching skills of Adult Basic Education teachers. This involved analyzing and developing a scope and sequence, identifying objectives and creating mathematics activities suitable for adults that would accomplish the stated objectives.

This handbook reflects the work of the following people:

Dr. Robert K. Leigh, Professor of Education, University of Alabama, Consultant for the preparation of this handbook

Jan Giattina, Jefferson County, Layout and Artwork

Margaret Ann Harrison, Project Secretary

Sheila Jandebeur, Project Typist

Group Members:

Mr. Bobby W. Anderson, Supervisor, Jefferson County
Mrs. Kathryn P. Anderson, ABE Teacher, Bibb County
Mr. Edward Davis, ABE Teacher, Morgan County
Miss Janie Dyson, Graduate Assistant
Mrs. Betty W. Gaulden, Graduate Assistant
Mrs. Beula Glasgow, ABE Teacher, Cleburne County
Mrs. Suzie Haney, ABE Teacher, Tuscaloosa County
Mr. Leon Hornsby, Area Supervisor
Mr. Sam Hughston, Area Supervisor
Mr. Richard Jennings, ABE Supervisor, Tuscaloosa County
Mrs. Voncile Lackey, Supervisor, Mobile County
Mr. Ollie Lester, Special State Consultant
Mr. V. Don Loftis, Graduate Assistant

Mr. William R. McQueen, Area Supervisor
Mrs. Mary Lou Maze, ABE Teacher, Tuscaloosa County
Mrs. Patricia Powell, ABE Teacher, Mobile County
Mrs. Gail Quarles, ABE Teacher, Huntsville
Mrs. Anne Smith, Supervisor, Tallapoosa County
Mr. Billy G. Smith, ABE Teacher, Jefferson County
Mr. Perry Vickers, ABE Teacher, Coffee County
Mr. Bob Walden, Area Supervisor
Mrs. Bobbie Walden, ABE Coordinator, Huntsville
Mr. W.J. Yelder, ABE Teacher, Dallas County

We would like to thank the superintendents and principals for making it possible for each participant to attend these meetings.

In the handbook, GIFT, the general objectives were to give teachers direction through scope and sequence, to provide a diagnostic tool for evaluation, to suggest techniques, and to present procedures through activities designed for the adult learner.

It is urged that this handbook be utilized by ABE teachers to help each adult learner better his role in the family and community.

Norman O. Parker
State Coordinator
Adult Basic Education
Program

Do Not Film This Page

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SCOPE AND SEQUENCE

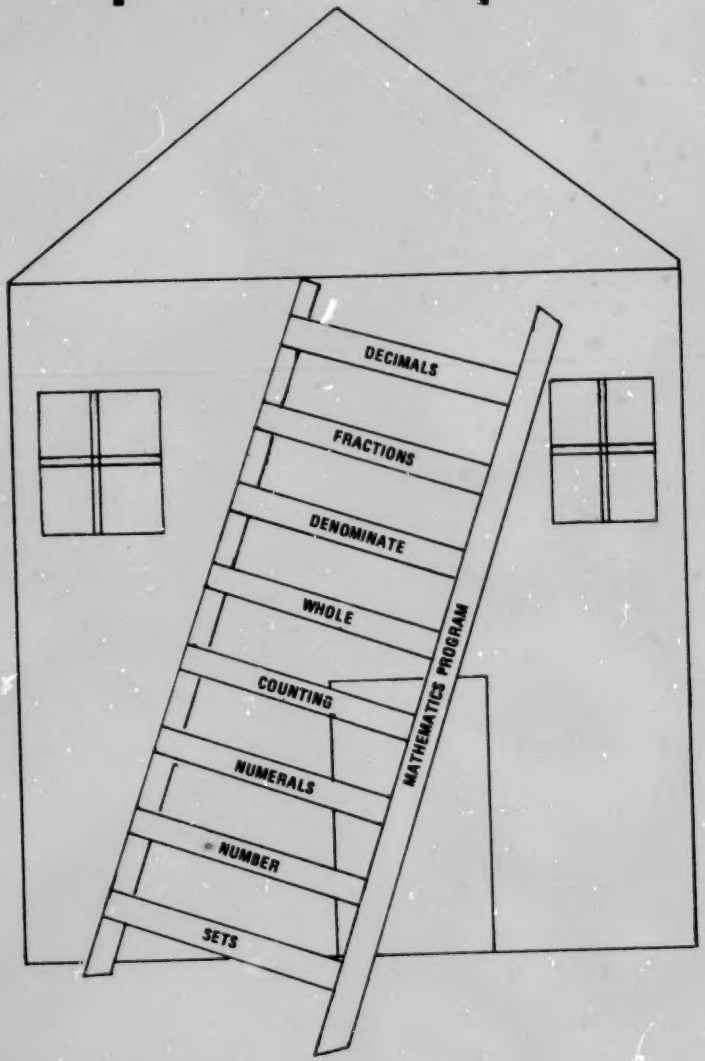
The skills developed in this handbook were selected from the Adult Basic Education Scope and Sequence Chart and represent the basic skills needed by every adult. The basic skills in mathematics will provide experiences in seven areas: I. Sets (level 1), II. Numbers and Numerals (level 1), III. Counting (level 1), IV. Whole Numbers (levels 1 and 2), V. Denominate Numbers (levels 1 and 2), VI. Fractions (levels 1 and 2), and VII. Decimals (levels 1 and 2). It is generally felt that if the learner is competent in the skills which come early in the sequence -- rather than being simply familiar with the entire sequence -- he will find content mastery less threatening.

The Adult Basic Education Scope and Sequence Chart for Mathematics has been included in this handbook, in order that one will be able to easily recognize each skill and its relation to the scope and sequence.

It is important to remember that a learner may need only a few skills from a particular area and may be working on more than one level in the seven areas. This scope and sequence should be used as a guide. Each teaching situation and learner will dictate the learning experience needed and the order of presentation.

SCOPE		SEQUENCE	
		Level 1	Level 2
I.	Sets	*	
II.	Numbers and Numerals	*	
III.	Counting	*	
IV.	Whole Numbers	*	*
V.	Denominate Numbers	*	*
VI.	Fractions	*	*
VII.	Decimals	*	*

Scope and Sequence



Mathematics Scope and Sequence

I. Sets (Level 1)
- A. The learner defines a set.
- B. The learner describes a set membership.
- C. The learner matches elements of sets (one to one correspondence) and recognizes greater than $>$ less than $<$.
- D. The learner recognizes equal and unequal sets.
- E. The learner recognizes equivalent and non-equivalent sets and recognizes the following signs: equal $=$, unequal $\neq$, greater than or equal to $\geq$, less than or equal to $\leq$.
- F. The learner identifies an empty set (null set) $\emptyset$.
- G. The learner illustrates union of sets and recognizes the addition (+) sign.
- H. The learner identifies subsets and recognizes the subtraction (-) sign.
- I. The learner identifies disjoint sets.
- J. The learner identifies intersection of sets.

II. Numbers and Numerals (Level 1)
- A. The learner identifies cardinal numbers of sets 0-9 and writes numerals 0-9.
- B. The learner recognizes that zero is a place holder.
- C. The learner writes cardinal numbers 1-100 (Level 1), 100-10,000 (Level 2).
- D. The learner matches numerals to number word names.
- E. The learner identifies ordinal position of a specific object.
- F. The learner identifies ordinal position of a specific object by naming corresponding ordinal number.
- G. The learner identifies Roman numerals and names corresponding Arabic numeral.

III. Counting (Level 1)
- A. The learner counts by ones to 100.
- B. The learner identifies number patterns.
  1. Even and odd numerals to 100.

2. Counting by 10's to 100.
3. Counting by 5's to 100.

IV. Whole Numbers (Level 1)

A. The learner adds numbers of one digit by counting.
B. The learner subtracts numbers of one digit.
C. The learner identifies addition and subtraction facts with a sum or minuend of 11 or less both horizontally and vertically.
D. The learner identifies addition and subtraction facts through a sum or minuend of 19 both horizontally and vertically.
E. The learner adds tens and ones.
F. The learner adds columns of three digits or more.
G. The learner adds two-digit numerals to one-digit numerals.
H. The learner adds two-digit numerals to two-digit numerals.
I. The learner subtracts one-digit from two-digit numerals.
J. The learner subtracts two-digit from two-digit numerals.
K. The learner subtracts numerals having zeros in the minuend.
L. The learner adds two digits to two digits involving renaming and regrouping.
M. The learner subtracts one digit from two digits involving renaming and regrouping.
N. The learner recognizes the concept of multiplication as successive addition.
O. The learner multiplies numbers having multipliers of 5 or less.
P. The learner performs and checks division in problems having dividends of 45 or less.
Q. The learner recognizes the associative properties of addition and multiplication.

IV. Whole Numbers (Level 2)

A. The learner adds numbers of 3 or more digits involving renaming or regrouping.
B. The learner subtracts numbers of 3 or more digits involving renaming or regrouping.

C. The learner knows multiplication facts through 9 x 9.
D. The learner knows basic division facts through dividends of 81.
E. The learner performs multiplication by one-digit multipliers involving carrying.
F. The learner performs and checks short division in problems having remainders.
G. The learner adds columns of numbers having two or more digits.
H. The learner recognizes that the product of any number and zero is zero.
I. The learner multiplies by multipliers of two or more digits.
J. The learner divides by a divisor of two or more digits.
K. The learner rounds off given numbers to a specified place.
L. The learner estimates answers to problems.

V. Denominate Numbers (Level 1)
A. The learner recognizes relative value of U.S. coins.
B. The learner counts U.S. coins and dollars.
C. The learner makes change in amounts up to ten dollars.
D. The learner associates the relative lengths of inches, feet, and yards.
E. The learner recognizes standard units of capacity and their relative sizes.
F. The learner identifies units of time (seconds, minutes, hours, etc.).
G. The learner determines the best unit of weights (pound, ounce and ton).

V. Denominate Numbers (Level 2)
A. The learner uses the dollar sign and decimal point.
B. The learner adds and subtracts amounts in dollars and cents.
C. The learner multiplies and divides amounts in dollars and cents by whole numbers.

D. The learner converts among units of measure.
E. The learner converts among units of time (second, hour, day, month).
F. The learner is introduced to the three basic units of the metric system -- meter, length; liter, capacity; and gram, weight.
G. The learner changes from metric unit to another metric unit.
H. The learner converts English units to metric units and vice versa.
I. The learner is introduced to square units of measure.
J. The learner converts square units to other square units.
K. The learner is introduced to cubic units of measure.
L. The learner converts cubic units to other cubic units.

VI. Fractions (Level 1)
A. The learner is introduced to common fractions.
B. The learner identifies the numerators and denominators of common fractions.
C. The learner compares the relative values of unit fractions.
D. The learner is introduced to the concepts of mixed numbers and improper fractions.
E. The learner distinguishes between proper and improper fractions.
F. The learner changes whole numbers to fractions.
G. The learner converts improper fractions to mixed numbers and vice versa.
H. The learner changes fractions to equivalent fractions.
I. The learner simplifies fractions to lowest terms.

VI. Fractions (Level 2)
A. The learner adds fractions having common denominators.
B. The learner subtracts fractions having common denominators.

C. The learner subtracts fractions having common denominators and requiring borrowing.
D. The learner finds the least common denominator (L.C.D.) for given fractions.
E. The learner adds fractions with unlike denominators after finding the L.C.D.
F. The learner subtracts fractions with unlike denominators after finding the L.C.D.
G. The learner multiplies two proper fractions.
H. The learner multiplies whole numbers and fractions or mixed numbers and fractions.
I. The learner reduces fractions by cancelling before multiplying.
J. The learner divides fractions by fractions.
K. The learner divides whole numbers by fractions and vice versa.
L. The learner expresses remainders in division problems as fractions.
M. The learner compares the values of common fractions.

VII. Decimals (Level 1)
A. The learner reads and writes decimals.
B. The learner adds using decimals.
C. The learner subtracts using decimals.

VII. Decimals (Level 2)
A. The learner compares decimals.
B. The learner multiplies decimals.
C. The learner divides decimals by whole numbers.
D. The learner divides decimals by decimals.
E. The learner converts fractions to decimals.
F. The learner is introduced to percentage.
G. The learner changes percents to decimal fractions.
H. The learner changes decimal fractions to percents.
I. The learner changes percents to common fractions.
J. The learner changes common fractions to percents.
K. The learner recognizes fractional equivalents for frequently-used percents.
L. The learner finds percent of a given number.
M. The learner computes what percent one quantity is of another.

N. The learner computes a number when a percent of it is given.
O. The learner computes the percent of increase and decrease.

CHARACTERISTICS OF THE ADULT LEARNER

It is impossible to describe, with any accuracy, the typical adult learner, just as it is impossible to describe the typical American. The following list of characteristics will not apply to any one student in the Adult Basic Education classroom, but it should give an idea of the special problems and strengths found in some adult learners. Most of these characteristics can work for or against the learner, depending, to a great degree, on the teacher's ability to turn a potential weakness into an asset.

The adult learner:

* will have definite educational goals of his own.
* has a great need for a sense of dignity and a feeling of worth.
* is a complex, seasoned, mature individual with fully-developed tastes and interests.
* will have an achievement level, mode and rate of learning, and ability different from every other adult learner.
* may have a great deal of knowledge in specific areas.
* may be more non-verbal than verbal in orientation.
* may be timid, unemployed, and unaware of job opportunities.
* may have been a failure, or a drop-out in previous school situations.
* may be very fearful of, and intimidated by, the school situation.

* has recognized his inability to function adequately in our society.

* may possess a negative attitude toward social institutions which represent authority.

* may have values, goals, and attitudes different from those of the typical member of the middle class.

* may be very fearful of competition and evaluation.

* may have a slower reaction time and suffer some decline in sight and hearing.

* has had a great deal of experience in living.

* is a part-time learner, often with heavy responsibilities at home, on the job, in the church, and community.

* is a voluntary learner and can leave class at will.

* expects information to be relevant, correct and up-to-date.

* may come from a low socio-economic background.

* may be a highly-successful and respected member of the community.

* may be very serious about education and may have preconceived notions about the roles and activities involved.

* has a great deal of experiential knowledge.

MATH TERMINOLOGY

1. Abacus: An instrument for performing calculations by sliding counters along rods or in grooves.

2. Addends: The numbers that are added in an addition problem.

3. Associative Property of Addition: Numbers may be regrouped for adding without changing the sum. $2 + (4 + 5) = (2 + 4) + 5$

4. Associative Property of Multiplication: Numbers may be regrouped for multiplying without changing the product. $2 \times (3 \times 4) = (2 \times 3) \times 4$

5. Cardinal Number: A number which tells how many things there are in a set or group. The cardinal numbers include zero and all the counting numbers.

6. Commutative Property of Addition: The order in which two numbers are added does not affect the sum. $3 + 4 = 4 + 3$

7. Commutative Property of Multiplication: The order in which the numbers are used in multiplication does not affect the product. $2 \times 4 = 4 \times 2$

8. Counting Numbers: The set of natural numbers exclusive of zero formed by beginning with one and adding one successively. {1, 2, 3, 4, ...}

9. Decimal Fraction (or Decimal): A symbol for a fractional number in which the denominator is named by a multiple of 10.

10. Decimal System: The system of numeration based on sets of ten.

11. Denominator: The numeral, written below the line

in a fraction, that represents the number of parts into which a unit is divided.

12. Denominate Numbers: Numbers which have a specific denomination. 7 ft. is a denominate quantity, while 7 is a mere abstract quantity.

13. Digit: A single symbol that names a number.

14. Disjoint Sets: Sets which contain no elements in common.

15. Distributive Property of Multiplication: The product obtained by multiplying the sum of two or more addends by a number may be obtained by multiplying each addend by that number and then adding the products.
$3 \times (20 + 4) = (3 \times 20) + (3 \times 4)$

16. Dividend: The answer in a division problem.

17. Divisor: The number the dividend is divided by.

18. Elements: The items in a set. Also called members.

19. Empty Set: A set with no members. (Also called Null Set)

20. Equal: Exactly the same in measure, quantity, number, or degree.

21. Equal Sets: Sets with identical members.

22. Equivalent Fractions: Fractions which name the same number.

23. Equivalent Sets: Sets which contain the same number of elements.

24. Even Number: A number which is evenly divisible by 2.

25. Fraction: Any number named by a numerator and a denominator. The indicated quotient of one integer divided by another.

26. Improper Fractions: Fractions in which the numerator is greater than the denominator.

27. Infinite Set: A set in which all members cannot be listed; indicated by three or four members and a series of dots; e.g., {0, 2, 4, ... }

28. Integer: A positive or negative whole number or zero.

29. Intersection: The set of members common to two or more sets.

30. Inverse of an operation: Opposite; subtraction is the inverse of addition; the inverse of adding 3 to 2 to get 5 is subtracting 3 from 5 to get 2. The inverse of multiplication is division. The inverse of multiplying 4 by 5 to get 20 is dividing 20 by 5 to get 4.

31. Least Common Denominator: The least common multiple of two or more denominators.

32. Members: The items in a set; also called elements.

33. Mixed Number: Any number named as a whole number and a fractional number less than one, e.g., 3 1/2.

34. Multiple: The product of a whole number and any other number, including itself.

35. Multiplicand: One of the two factors in the basic operation of multiplication.

$$\begin{array}{r} 67 \text{ (multiplicand)} \\ \times\ 2 \text{ (multiplier)} \\ \hline 134 \text{ (product)} \end{array}$$

36. Natural Numbers: The set of numbers {1, 2, 3, 4, 5, 6, ...} ordinarily used in counting.

37. Negative Number: One which is numerically less than zero.

38. Number: An abstract concept of quantity.

39. Number Line: A horizontal line marked off into equal intervals with the numbers named in order from left to right, smaller to larger.

40. Numerals: Concrete symbols for numbers.

41. Numerator: The numeral, written above the line in a fraction, that represents the number of parts of the unit being considered.

42. Odd Number: The subset of whole numbers each of which is one more than some whole number multiple of 2. The numbers 1, 3, 5, 7, 9, and so forth.

43. Operation: A clearly defined mathematical process, such as addition or multiplication.

44. Ordinal Number: A numeral used to express relative order: 1st, 2nd, 3rd, etc.

45. Percent: Parts per hundred.

46. Placeholder: A box or frame used to show that one or more numerals are missing, e.g., $5 + \square = 8$.

47. Place Value: The value assigned to a digit's position within the numeral.

48. Positive Number: One which is numerically greater than zero.

49. Prime Number: Any whole number that is greater

than 1 and has no whole-number factors other than 1 and the number itself.

50. Product: The answer in a multiplication problem.

51. Quotient: The answer in a division problem.

52. Remainder: The number left over.

53. Round Off: To simplify a decimal number by approximating it to the nearest tenth, hundredth, etc.

54. Set: A collection or group -- it may contain things, numbers, people, or anything at all.

55. Subset: A subset of a given set is one that contains no elements which are not elements of the given set.

56. Subtrahend: The smaller of two given quantities in the operation of subtraction.

57. Sum: The answer to an addition problem.

58. Symbol: A character, letter, or abbreviation to represent operations, quantities, relations, etc. (See listed below.)

59. Unlike Fractions: Fractions whose denominators are not the same.

60. Union: A joining of the members of sets without repeating the common members.

61. Unit Fraction: A fraction that has the numeral one as its numerator.

62. Whole Numbers: The set of natural numbers including zero: {0, 1, 2, 3, 4, ...}

SYMBOLS

> Greater than (more than)	÷ Division
< Less than	∪ Union of sets
≥ Greater than or equal to	∩ Intersection of sets
≤ Less than or equal to	∅ Empty Set
= Equal	⊂ Subset of
≠ Not equal	∈ Element of
+ Addition	{ } Braces - enclose elements of a set
- Subtraction	
x Multiplication	N Indicates the number of elements in a set

TABLES OF MEASURES

Measures of Length

12 inches (in.)=1 foot (ft.)
3 feet =1 yard (yd.)
5,280 feet=1 mile (mi.)
16½ feet=1 rod (rd.)

Measures of Area

144 square inches (sq. in.)=1 square foot (sq. ft.)
9 square feet =1 square yard (sq. yd.)

Measures of Volume

1728 cubic inches (cu. in.)=1 cubic foot (cu. ft.)
27 cubic feet =1 cubic yard (cu. yd.)

Measures of Time

60 seconds (sec.)=1 minute (min.)
60 minutes =1 hour (hr.)
24 hours=1 day (da.)
7 days =1 week (wk.)
52 weeks=1 year (yr.)
12 months (mo.)=1 year
365 days = 1 year
366 days = 1 leap year
100 years = 1 century

Liquid Measures

2 cups =1 pint (pt.)
2 pints =1 quart (qt.)
4 quarts=1 gallon (gal.)

Dry Measures

2 pints (pt.)=1 quart (qt.)
8 quarts =1 peck (pk.)
4 pecks =1 bushel (bu.)

Measures of Weight

16 ounces (oz.)=1 pound (lb.)
2,000 pounds =1 ton (T.)

ADULT BASIC EDUCATION MATH ASSESSMENT INSTRUMENT

This Adult Basic Education Math Assessment Instrument has been developed for use with the handbook and should be administered early in the learning situation and can be readministered at a later date to check progress. There is a correlation between items of the assessment instrument and elements of the scope and sequence. The teacher should take certain precautions before entering any testing program. The learner must be assured that he cannot possibly "fail" the test. The ABE teacher should also point out that the assessment instrument will indicate his strengths as well as his weaknesses. When administering the assessment the teacher must keep in mind that the purpose is to determine the instructional level of the learner in order to select the appropriate instructional materials. The teacher should always find something encouraging to talk about when interpreting the results for the learner.

Even though assessment will require an investment of time, it will be time well spent. It provides an opportunity for the teacher to build rapport with the learner which will enhance other counseling efforts at some future time.

ABE
Assessment Instrument

JAN. 28, 1898.

8th GRADE ARITHMETIC

WRITTEN.

1. How many bushels in a heap of grain in the form of a cone whose base is 8 feet in diameter and whose altitude is 4 feet?

2. Cubical contents of triangular prism, the area of whose base is 28 sq. ft. and whose perpendicular height is 16 inches.

3. Entire surface of a triangular pyramid, whose base is a right triangle with its sides 3, 4, 5 inches and whose height is 12 inches.

4. I have a rectangular field 80 rods long by 6 rods wide. If it is divided into 10 equal rectangular lots having their fronts on the longest side of the field; what will be the cost of fencing to inclose and separate the lots at $6 a rod?

5. A street 3 rods wide, 200 rods long, is on an average 10 inches above grade; how many cubic yards of earth must be removed to bring the street to grade?

ORAL.

1. How many acres in a rectangular field 30 rods long and 22 rods wide?

2. A board contains 27 sq. ft. and is in the form of a parallelogram. It is 18 ft. long. What is perpendicular height?

3. What is area of triangle whose base is 16 inches, altitude 10 inches?

4. What is length of base of a triangle whose area is 84 sq. in. and perpendicular height is 24 inches?

5. Two parallel sides of a trapezoid are 10 and 17 inches and the perpendicular distance between 12 inches. What is area in square inches?

6. Two parallel sides are 16 feet 22 inches; area 190 sq. ft. What is altitude?

7. Find area of circle 6 inches in diameter. Three ways.

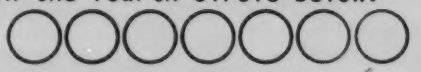
8. Area of circle is 60 sq. in. Find diameter.

Fill in the Blanks with the Correct Number in the Sequence

1. 57 ( ) 59 ( ) 61 62 63 64 ( ) 87 ( )
   89 ( )

2. 15 ( ) 25 30 ( ) ( ) 45

3. Write 2 in the second circle below.
   Write 7 in the seventh circle below.
   Write 4 in the fourth circle below.



4. Draw a line between the number and its name.

4	sixteen
16	IV
12	XII
9	twenty
20	nine

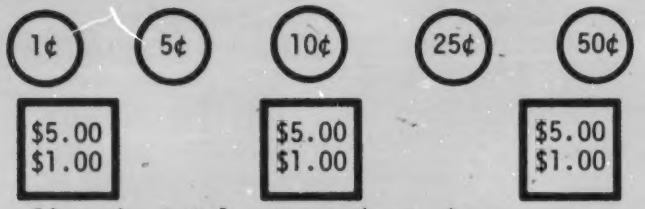
5. $\begin{array}{r} 5 \\ +3 \\ \hline \end{array}$ $\begin{array}{r} 9 \\ -2 \\ \hline \end{array}$ 9 - 2 =

6. 16 - 7 = $\begin{array}{r} 16 \\ -9 \\ \hline \end{array}$ $\begin{array}{r} 14 \\ +3 \\ \hline \end{array}$ $\begin{array}{r} 45 \\ -16 \\ \hline \end{array}$

7. $\begin{array}{r} 45 \\ +27 \\ \hline \end{array}$ $\begin{array}{r} 4 \\ 6 \\ 3 \\ \hline \end{array}$ $\begin{array}{r} 40 \\ -21 \\ \hline \end{array}$

8. 2 + 2 + 2 = 2 x 3 =

9. 2 x 2 x 2 =
   (2 x 2)x 2 =
   2 x(2 x 2)=

10. 

Give the total amount shown above. _____

11. How much change will a person receive from $5.00 if his bill is $4.18? _____

12. Write the time shown on this clock. _____

13. Match the appropriate units of measurement.

coal	pounds
butter	tons
belt	inches
dress fabric	yards

14. Check (✓) the objects that are divided into halves ($\frac{1}{2}$).

15. Write the fractions for the shaded parts.

16. Circle the numerator. Draw a box around the denominator.

$\frac{3}{4}$ $\frac{5}{2}$

17. Circle the improper fractions.

$\frac{4}{5}$ $\frac{7}{5}$ $\frac{5}{4}$

18. 2 wholes = $\frac{\quad}{3}$

19. $1 + \frac{1}{2} = \frac{\quad}{2}$

20. $\frac{4}{8} = \frac{\quad}{4} = \frac{\quad}{2}$

21. Change to decimal. $\frac{1}{4}$ = ____

22. .25 + .5 = ____

23.
$$\begin{array}{r} 6.275 \\ -1.243 \\ \hline \end{array}$$

24.
$$\begin{array}{r} 426 \\ +187 \\ \hline \end{array} \qquad \begin{array}{r} 627 \\ -258 \\ \hline \end{array}$$

25. $\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$ $72 \div 8 =$ ____ $\begin{array}{r} 18 \\ \times 6 \\ \hline \end{array}$ $7\overline{)65}$

26. $\frac{1}{4} + \frac{2}{4} =$

27. $\frac{5}{8} - \frac{4}{8} =$

28. $7\frac{1}{8} - 4\frac{7}{8}$ $\quad\quad$ $\frac{1}{2} + \frac{3}{4}$ $\quad\quad$ $\frac{2}{3} - \frac{1}{2}$

29. $\frac{2}{3} \times \frac{1}{4} =$

30. $4\frac{1}{2} \times 6 =$

31. $\frac{2}{4} \times \frac{2}{8} =$

32. $\frac{4}{10} \div \frac{1}{10} =$

33. $9 \div \frac{3}{5} =$

34. Circle the fraction that is greater.

$\frac{1}{3}$ or $\frac{1}{2}$ $\quad\quad$ $\frac{2}{5}$ or $\frac{3}{5}$ $\quad\quad$ $\frac{1}{6}$ or $\frac{4}{5}$

35. Circle the decimal of greatest value.

.3 $\quad$ .035 $\quad$ .30 $\quad$ .31

36. $.004 \times .3$ $\quad\quad$ $15\overline{)2.25}$ $\quad\quad$ $1.3\overline{).039}$

37. .05 = ____% $\quad$ 8% = ____(decimal) $\quad$ $.37\frac{1}{2}$ = ____%

38. 50% = ____(fraction) $\frac{3}{4}$ = _____%

39. 25% of 64 = ____ 9 is ___% of 20
31 is 4% of ____

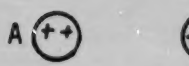
40. A dealer wishes to make a 25% profit on the selling price of a rug that cost him $60. What should the selling price be? _____

41. A dealer sells a chair at a 10% discount. If the original price of the chair is $250, what is the selling price at the 10% discount?_____

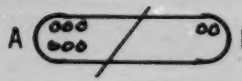
42. Match the sets with symbols.

A-B (minus)

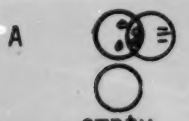
A>B (greater than)



A+B or AUB (union)



A=B (one to one correspondence = equivalent)



A∩B (xy) (intersection)

∅ (null)

ANSWERS

1. 58, 60, 65, 88, 90

2. 20, 35, 40

3. ◯(2)◯(4)◯◯(7)

4. 4 — sixteen
   16 — IV
   12 — XII
   9 — twenty
   20 — nine

5. 8, 7, 7

6. 9, 7, 17, 29

7. 72, 13, 19

8. 6, 6

9. 8, 8, 8

10. $18.91

11. $.82

12. 8:10

13. coal — pounds
    butter — tons
    belt — inches
    dress fabric — yards

14.

15. $\frac{1}{4}$ $\frac{1}{2}$

16. (3)/4 (5)/2

32

17. $\frac{7}{5}$ $\frac{5}{4}$

18. 6

19. 3

20. 2,1

21. .25

22. .75

23. 5.032

24. 613, 369

25. 32, 9, 108, 9r2

26. $\frac{3}{4}$

27. $\frac{1}{8}$

28. $2\frac{1}{4}$, $2\frac{1}{4}$, $\frac{1}{6}$

29. $\frac{1}{6}$

30. 27

31. $\frac{1}{6}$

32. 4

33. 15

34. $\frac{1}{2}$, $\frac{3}{5}$, $\frac{4}{5}$

35. .31

36. .0012, .15, .03

37. 5%, .08, $37\frac{1}{2}\%$

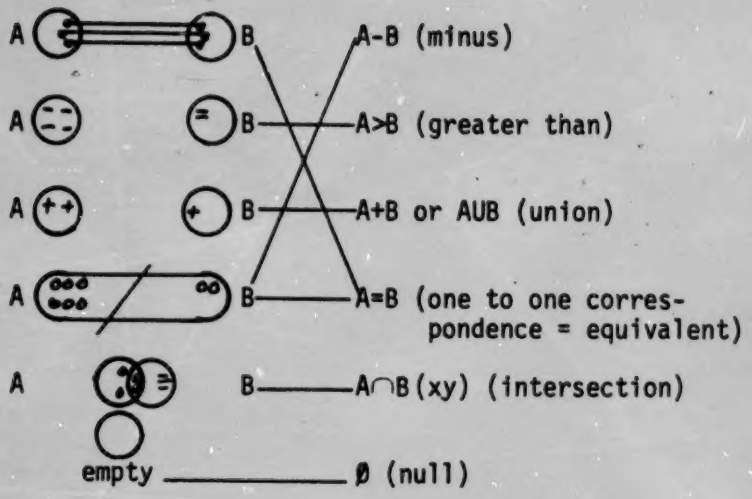
38. $\frac{1}{2}$, 75%

39. 16, 45%, 775

40. $75

41. $225

42.


A
B
A-B (minus)
A
B
A>B (greater than)
A
B
A+B or AUB (union)
A
B
A=B (one to one correspondence = equivalent)
A
B
A∩B (xy) (intersection)
empty
∅ (null)

TEACHER'S GUIDE TO ASSESSMENT INSTRUMENT

Problem	corresponds to	Scope	Level	Sequence
1		II	1	C
2		III	1	B
3		II	1	F
4		II	1	D,G
5		IV	1	A,B,C
6		IV	1	D,E
7		IV	1	F,H,K
8		IV	1	N
9		IV	1	Q
10		V	1	A,B
11		V	1	C
12		V	1	F
13		V	1	G
14		VI	1	A
15		VI	1	A
16		VI	1	B
17		VI	1	E
18		VI	1	F
19		VI	1	G
20		VI	1	H
21		VII	1	A
22		VII	1	B
23		VII	1	C
24		IV	2	A,B
25		IV	2	C,D,E,F
26		VI	2	A
27		VI	2	B
28		VI	2	C,D,E,F
29		VI	2	G
30		VI	2	H
31		VI	2	I
32		VI	2	J
33		VI	2	K
34		VI	2	M
35		VII	2	A
36		VII	2	B,C,D
37		VII	2	F,G,H

Problem	corresponds to	Scope	Level	Sequence
38		VII	2	I,J
39		VII	2	L,M,N
40		VII	2	O
41		VII	2	O
42		I	1	C,D,E,G,H

INTRODUCTION TO ACTIVITIES

These activities were designed to meet the needs of the ABE learner in the different stages in the process of learning mathematical concepts.

To understand a mathematical concept, the learner should begin on a social or concrete level with activities actively involving the learner, such as manipulating concrete objects: money, food, measuring devices, blocks or objects, etc. On the concrete level the learner needs materials to manipulate, touch, and see. After gaining an initial understanding of the mathematical concept, the learner should be able to function on the semi-concrete level with pictures which relate to the concept, flannel board materials, abacus, or transparencies. Finally, when the teacher is certain of mastery of the concept, the learner should be able to function on the abstract level with paper and pencil activities.

The ABE teacher is encouraged to adapt the activities presented to meet the needs of the adult learner on his level.

Sets

I. Sets (Level 1)

A. The learner describes a set.

After a discussion of sets with the instructor, the learner describes 3 sets in the classroom.

Examples: set of windows, set of people, set of chairs, etc.

I. Sets (Level 1)

B. The learner describes set membership.

Given a set containing articles of clothing, (coat, dress, shoes, hat, etc.) the learner describes each member of the set by giving the names of articles of clothing.

I. Sets (Level 1)

C. The learner matches sets (one-to-one correspondence) and recognizes signs for greater than (>) and less than (<).

The learner matches the set of people to the set of chairs in the classroom and determines if chairs are vacant. If chairs are vacant, the learner writes: "Chairs are greater than people." (chairs > people) If people are without chairs, the learner writes: "Chairs are less than people." (chairs < people).

I. Sets (Level 1)

D. The learner recognizes equal and unequal sets and recognizes signs. = ≠

Given one set, the learner recognizes other sets which have an equal number and recognizes the sign (=) Given the number of members of a set, the learner recognizes which have more than or less than the number of members in the described set and recognizes the sign (≠).

I. Sets (Level 1)

E. The learner recognizes equivalent and nonequivalent sets.

Teacher defines an "equivalent" set -- equivalent sets are two sets which may be put into one-to-one correspondence. Learner matches equivalent sets on a one-to-one basis.

1. A = {o,o,△,△}
2. B = {1,2,3}
3. C = {Bob}
4. D = {four, six}

H = {January}
I = {one, two}
J = {o,△,□}
K = {7,8,9,10}

Learner identifies nonequivalent sets (A) (C)

A. {x,y,z} {1,2,3,4}
B. {dog, cat} {1,2}
C. {a,b,c} {r,s,t,u}

I. Sets (Level 1)

F. The learner identifies an empty set (null set).

Teacher defines empty set -- a set that contains no members.

Examples: Set of adults who are usually in the classroom at 3 o'clock in the morning. { }
Amount of money in checking account with overdrawn balance. { }

Learner makes up 4 or 5 of his own empty sets.

I. Sets (Level 1)

G. The learner illustrates union of sets and recognizes signs (addition) + & U.

Using the first row of learners in the room as set A and the second row as set B, ask the members of A to raise their hands, then the members of B. Then ask a learner to define AUB (A union B) and another to symbolize it on the board.

AUB means that set A is joined with set B.

I. Sets (Level 1)

H. The learner identifies subsets and recognizes sign, ($\subset$).

Using names of learners represented in the classroom to form a set, show that the men form a subset of the learners in the classroom.

A = {Learners in the classroom}
or
A = {Mr. Jones, Mr. Minor, Rev. Taylor, Mary Jones, Mrs. Tyner}

B = {Men in the classroom}
or
B = {Mr. Jones, Mr. Minor, Rev. Taylor}

$B \subset A$ B is a subset of A.

in the intersected portion of the two circles which is shaded. The ring is the only member of a set called the "intersected set" of the two subsets. The standard mathematical symbol for set intersection is $\cap$, an inverted version of the union symbol $\cup$.

I. Sets (Level 1)

I. The learner identifies disjoint sets.

Use the learners in class to form a disjoint set. Let the males represent Set E and the females represent Set F. Ask the members of Set E to raise their hands and the members of Set F to stand. For reinforcement, ask one learner to define* disjoint set and another to symbolize it on the board.

I. Sets (Level 1)

J. The learner identifies intersection of sets.

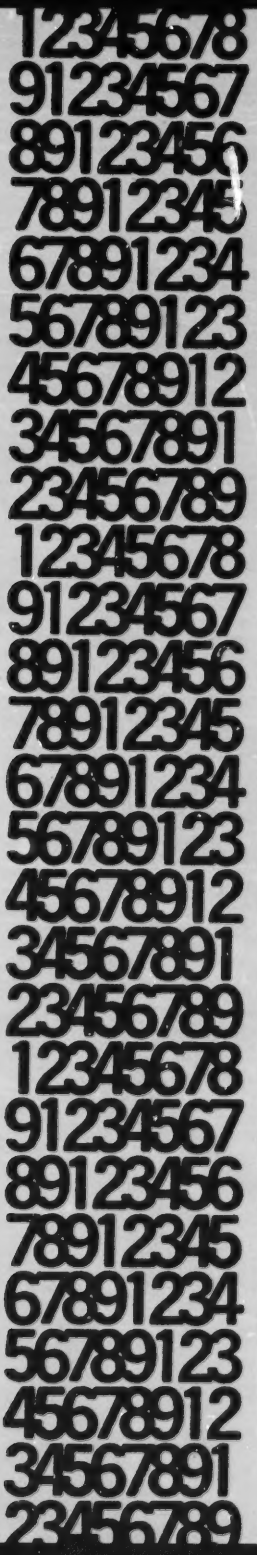
{pearls, ring} {ring, watch} = {ring}

Set A contains pearls and an engagement ring.
Set B contains a ring and a watch.

The sets are indicated by circles enclosing their respective elements. The ring is a member of both subsets and is indicated by the appearance of

*Refer to "Terminology" page.

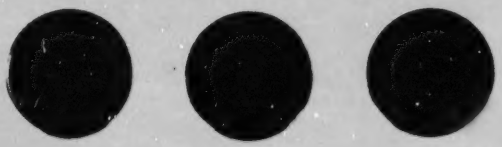
Numbers and Numerals



II. Numbers and Numerals (Level 1)

A. The learner identifies cardinal numerals of set 0-9.

Using the overhead projector and nine pennies (or play money) the teacher displays different groups of pennies. The learner gives the cardinal numeral to correspond with each group of pennies. The cardinal numeral is the name of the number of objects in the set.



Cardinal numeral for set is 3.

II. Numbers and Numerals (Level 1)

B. The learner recognizes that zero is a place holder.

Explain that there are only 9 digits in our number system with 10 symbols (Hindu-Arabic) - 0,1,2,3,4,5,6, 7,8,9. Place value is useful because it allows the learner to write large amounts with few symbols. The symbol zero is valuable as a place holder but is not considered a digit. The numeral for a number of ten objects is indicated by placing a one in the "ten's

place" and placing a zero in the ones place to indicate one ten and no ones. It is sometimes helpful in the beginning to write about the digits in place value to explain this concept.

hundreds	tens	ones
1	0	0

It may also be necessary to group objects in tens and actually tie the ten objects together to facilitate counting and understanding the concept of place value in our base ten system. Ten groups of ten may actually be tied to make 100 and ten hundreds tied to make 1000.

II. Numbers and Numerals (Level 1)

C. The learner writes cardinal numbers 1-100.

The learner writes the missing numerals in a number chart from one to 100.

II. Numbers and Numerals (Level 1)

C. The learner writes cardinal numerals 100-10,000.

Teacher places the following numerals on the board:

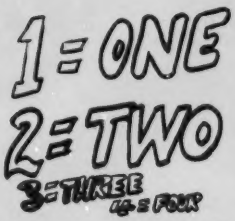
1,000
900
70
3
40

and explains* that this is the number 1,973 using expanded notation. The teacher writes the number 1,954 on the board and the learner uses expanded notation to describe the numeral. 1,000
900
50
4

Give an example in the ten thousands (10,546) 10,000
500
40
6

II. Numbers and Numerals (Level 2)

D. The learner matches numerals to word names.



The learner is presented a list of numerals and word names. He draws a line from the number word to the correct numeral.

300	five hundred seventy-five
575	ten thousand
7,942	three hundred
2,700	two thousand seven hundred
10,000	seven thousand, nine hundred, forty-two

*Expression of a numeral emphasizing the place value of each digit. Example: 874 expressed as 800 + 70 + 4 or (8 x 100) + (7 x 10) + (4 x 1).

II. Numbers and Numerals (Level 1)

E. The learner identifies ordinal position of specific objects.

The learner lists the members of his family in the order that they were born. He identifies the position of each member by first, second, third, etc. in the order in which they were born.

Father	33 years old	1940	(first)
Mother	32 years old	1941	(second)
Son	10 years old	1963	(third)
Son	7 years old	1966	(fourth)
Daughter	3 years old	1970	(fifth)

II. Numbers and Numerals (Level 1)

F. The learner identifies ordinal position of a specific object by naming corresponding ordinal number.

Show a picture of people in line to check out groceries. Each person is given a name. Cashier, Jan, Mike, Tim, Sue, Joe, Betty. The learner names the first person to check out (Jan), the third person to check out (Tim), and the sixth person to check out (Betty).

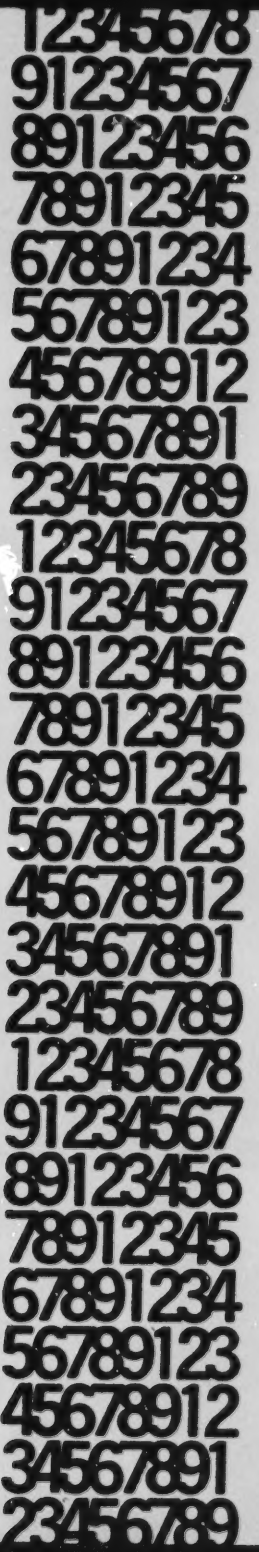
II. Numbers and Numerals (Level 2)

G. The learner identifies Roman numerals and names corresponding Arabic numerals.

Using the first twelve Arabic and Roman numerals the learner matches corresponding Arabic numerals to Roman numerals. Demonstrate this ability by writing correctly (in Arabic numerals) the times indicated by the clocks (with Roman numerals) which are on the hour.

2 o'clock 8 o'clock 5 o'clock

Counting


12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789
12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789
12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789

III. Counting
(Level 1)

B. The learner identifies number patterns: 1. even and odd numerals to 100.

Using a number line the learner identifies even and odd numerals to 100 and demonstrates ability by counting food stamps of $2 units.

III. Counting
(Level 1)

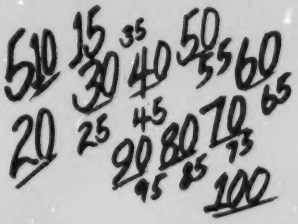
B. The learner identifies number patterns: 2. counting by 10's to 100.

Using a card with numerals 1 to 100 the learner identifies the pattern of counting by 10's. He can demonstrate his ability by determining the number of dimes needed to dry a certain number of loads of clothing.

Joe needs to dry eight (8) loads of clothing. The dryer costs ten cents per load. How much money will he need? (80 cents or 8 dimes)

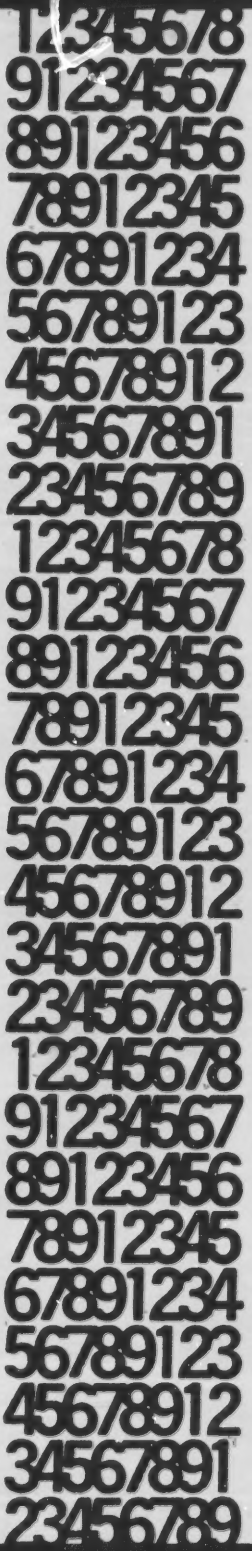
III. Counting
(Level 1)

B. The learner identifies number patterns: 3. Counting by 5's to 100.



Using a card with numerals from 1 to 100, the learner identifies the pattern of counting by 5's and demonstrates this ability by determining the number of note cards, pieces of gum, etc. which are needed so that each person in the class has five.

Whole Numbers



IV. Whole Numbers
(Level 1)

A. The learner adds numbers of one digit by counting.

The learner adds one digit numbers by counting groups of numbers.

1 + 2 = (3) 2 + 1 = (3)

$$\begin{array}{r} 2 \\ +1 \\ \hline (3) \end{array}$$

IV. Whole Numbers
(Level 1)

B. The learner subtracts numbers of one digit.

Using the number line, objects, or abacus*, the learner subtracts numbers of one digit.

*Abacus -- defined #1
Number line -- defined #11

IV. Whole Numbers
(Level 1)

C. The learner identifies addition and subtraction facts with a sum or minuend of 11 or less (both horizontally and vertically).

Using flash cards, the learner gives the answer to each problem to his partner and then gives the partner a turn.

1	2	3 + 1 = (4)	5	6	7 - 1 = (6)
+1	+1		-1	-1	
(2)	(3)	4 + 1 = (5)	(4)	(5)	8 - 1 = (7)

IV. Whole Numbers
(Level 1)

D. The learner identifies addition and subtraction facts through a sum or minuend of 19 (both horizontally and vertically).

The learner recognizes the action in problems by deciding whether to add or subtract.

1. Mr. Smith had 8 dollars and earned 9 more dollars. How much did he have altogether?

$8 + 9 =$ $\quad$ 9
$\quad\quad\quad

IV. Whole Numbers
(Level 1)

E. The learner adds tens and ones.

Using money, abacus, gem clips or any objects, the learner adds tens and ones.

10¢ + 3¢ = (13¢)

$$\begin{array}{r} 10¢ \\ +3¢ \\ \hline (13¢) \end{array}$$

IV. Whole Numbers
(Level 1)

F. The learner adds columns of three digits or more.

Joe, a mail carrier, walked 4 miles on Monday, 5 miles on Tuesday, and 2 miles on Wednesday. How far did he walk in all? (11)

4 miles + 5 miles + 2 miles = 11 miles

$$\begin{array}{r} 4 \\ 5 \\ +2 \\ \hline 11 \end{array}$$

IV. Whole Numbers
(Level 1)

G. The learner adds two digit numerals to one digit numerals.

Sam helps down at the teen center after school. Last night someone put away the phonograph records by throwing them all in a box. Sam counted 14. Later he found 8 more. How many phonograph records did Sam find? (22)

14 records
+8 records
(22) records

IV. Whole Numbers
(Level 1)

H. The learner adds two digit numerals to two digit numerals.

Using desks, chairs, beads, learners, members of class or buttons, the learner adds two-digit numerals to two-digit numerals. There are 11 women and 18 men in our class. How many people are in our class? (29)

IV. Whole Numbers
(Level 1)

I. The learner subtracts one-digit from two-digit numerals.

Mrs. Coaley has $16.00. She has to spend $6.00 for medicine. How much money will Mrs. Coaley have left to buy a new dress? ($10.00)

$16.00 total amount of money
-6.00 spent for medicine
($10.00) left to buy a new dress

IV. Whole Numbers
(Level 1)

J. The learner subtracts two-digit from two-digit numerals.

Given problems in subtraction of two-digit from two-digit numerals the learner solves:

37	74	66	79	48
-13	-31	-40	-21	-32
(24)	(43)	(26)	(58)	(16)

IV. Whole Numbers
(Level 1)

K. The learner subtracts numerals having zeros in the minuend.

Ralph had ten tickets and sold four to a friend. How many more does he have to sell? (6)

10 tickets
-4 sold
6 left to sell

IV. Whole Numbers
(Level 1)

L. The learner adds two digits to two-digits involving renaming and regrouping.

28	may be renamed	2 tens and 8 ones
+16		+1 ten and 6 ones
		3 tens and 14 ones
	or	4 tens and 4 ones
	or	(44)

63

IV. Whole Numbers
(Level 1)

M. The learner subtracts one-digit from two-digits involving renaming and regrouping.

Present the problem situation by giving the mathematical sentence 27 - 8 = ? We are to subtract 8 ones from 2 tens and 7 ones. We cannot subtract 8 ones from 7 ones. Regroup 2 tens to 1 ten and 17 ones. 17 ones less 8 are 9 ones. We have 1 ten and 9 ones.

$$\begin{array}{r} 27 \\ -8 \\ \hline (19) \end{array}$$

regrouping: $27 - 8 = (20 + 7) - 8$

$$8 = (7 + 1)$$

$$27 - 8 = 20 + 7 - 7 - 1$$

$$= 20 - 1$$

$$= 19$$

renaming: 27 may be renamed 2 tens and 7 ones

$$\begin{array}{r} -8 \\ \hline \end{array} \qquad - \underline{\qquad\qquad 8 \text{ ones}}$$

Since we cannot subtract 8 ones from 7 ones, we rename again:

$$\begin{array}{r} 1 \text{ ten and } 17 \text{ ones} \\ - \qquad\qquad 8 \text{ ones} \\ \hline 1 \text{ ten and } 9 \text{ ones} \end{array} \quad \text{or } (19)$$

IV. Whole Numbers
(Level 1)

N. The learner recognizes the concept of multiplication as successive addition.

Using the number line or money the learner will recognize the concept of multiplication as successive addition.

Problem: Mary works as a secretary. She earns $3 per hour. If Mary works 4 hours how much money will she earn?

$3 + $3 + $3 + $3 = ($12)

4 x $3 = ($12)

IV. Whole Numbers
(Level 1)

0. The learner multiplies numbers having multipliers of 5 or less.

Using the table shown, the learner multiplies numbers having multipliers of 5 or less by filling in the blocks.

1. The numerals in the left column name the first factor.*

2. The numerals in the top row name the second factor.

3. A product*, such as 3 x 2 is named where the 3-row and 2-column intersect.

X	0	1	2	3	4	5
0						
1						
2						
3						
4						
5						

*Factor is the term used to label the elements which, when multiplied together, form a product. (factor x factor = product)

IV. Whole Numbers
(Level 1)

P. The learner performs and checks division in problems having dividends of 45 or less.

Forty-five people went on a picnic. They were divided into nine equal groups to play games. How many people were in each group? (5)

45 people ÷ 9 groups = ? how many in each group?

$$\begin{array}{r} 5 \text{ people in each group} \\ 9\overline{)45} \\ \underline{45} \end{array}$$

IV. Whole Numbers
(Level 1)

O. The learner recognizes the associative principles of addition and multiplication.

Given three numbers, the learner recognizes that the way in which addends are grouped does not affect the sum*.

Example: $(4 + 5) + 6 = 4 + (5 + 6)$

addition	multiplication
$4 + 5 + 6 = 15$	$2 \times 3 \times 4 = 24$
$5 + 6 + 4 = 15$	$3 \times 2 \times 4 = 24$
$4 + 6 + 5 = 15$	$2 \times 4 \times 3 = 24$
$6 + 5 + 4 = 15$	$4 \times 3 \times 2 = 24$
etc.	etc.

*See terminology for definition of associative property of multiplication.

IV. Whole Numbers
(Level 2)

A. The learner adds numbers of 3 or more digits involving renaming or regrouping.

Given the following ticket sales figures for football games, the learner computes the total number of tickets sold for each game.

Game	General Admission Tickets	Reserved	Total
September 10	2,146	1,987	
September 17	1,818	1,052	
September 24	2,356	1,833	

$$
\begin{array}{rl}
2{,}146 = & 2{,}000 + 100 + 40 + 6 \\
+1{,}987 = & 1{,}000 + 900 + 80 + 7 \\
\hline
 & 3{,}000 + 1000 + 120 + 13 = 3{,}000 \\
 & \qquad\qquad\qquad\qquad\quad\ \ 1{,}000 \\
 & \qquad\qquad\qquad\qquad\qquad\ \ 120 \\
 & \qquad\qquad\qquad\qquad\qquad\quad\ 13 \\
 & \qquad\qquad\qquad\qquad\quad\ (4{,}133)
\end{array}
$$

IV. Whole Numbers
(Level 2)

B. The learner subtracts numbers of 3 or more digits involving renaming or regrouping.

Given the following water meter readings, the learner determines how many gallons of water were used during the month of January.

January 1	31,402
February 1	53,621

53,621 reading at end of February
-31,402 reading at end of January
(22,219)

IV. Whole Numbers
(Level 2)

C. The learner knows multiplication facts through 9 x 9.

The learner fills in all empty squares in the Table of Multiplication Facts below.

A Table of Multiplication Facts

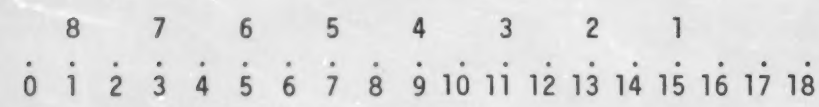
	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3									
4									
5									
6									
7									
8									
9									

IV. Whole Numbers
(Level 2)

D. The learner knows basic division facts through dividends of 81.

The learner computes the following:

16 ÷ 2 = (8) using a number line.



IV. Whole Numbers
(Level 2)

E. The learner performs multiplication by one-digit multipliers involving carrying.

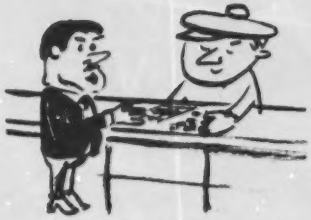
A secretary usually types 48 words per minute. How many words could she type in 2 minutes? (96) In 3 minutes? (144)

48 x 2 = 96

48 words per minute
x3 minutes to type
144 words typed in three minutes

IV. Whole Numbers
(Level 2)

F. The learner performs and checks short division in problems having remainders.



Given a number of pennies, the learner determines how many 6¢ postcards he is able to purchase and how much money he would have left.

$$\begin{array}{r} 6 \text{ postcards} \\ 6\ )\overline{37} \text{ pennies} \\ \underline{36} \\ 1 \text{ penny remains} \end{array}$$

IV. Whole Numbers
(Level 2)

G. The learner adds columns of three digits or more to two or more digits.

The learner determines the total amount of deductions from his weekly paycheck.

FICA	$ 7.00
Federal Income Tax	20.00
State Income Tax	2.60
Retirement	4.50
Union Dues	1.25
	35.35 deductions per week

IV. Whole Numbers
(Level 2)

H. The learner recognizes that the product of any number and zero is zero.

Mr. Sims and Mr. James work on the assembly line at Upton Corporation where they are paid 10¢ for each component completed. During one morning Mr. Sims completed 50 parts, but Mr. James' assembly line was down so he didn't complete any parts. How much money did each man make? (Mr. Sims -- $5.00, Mr. James -- $0)

Mr. Sims	Mr. James
50 parts	0 parts
x.10 per component	x.10 per component
00	00
50	00
$5.00	0

IV. Whole Numbers
(Level 2)

I. The learner multiplies by multipliers of two or more digits.

Joe has 32 contestants for his TV show. If he asks each contestant 12 questions, how many questions will he ask in all? (384)

32 contestants
x12 questions
64
32
384 questions in all

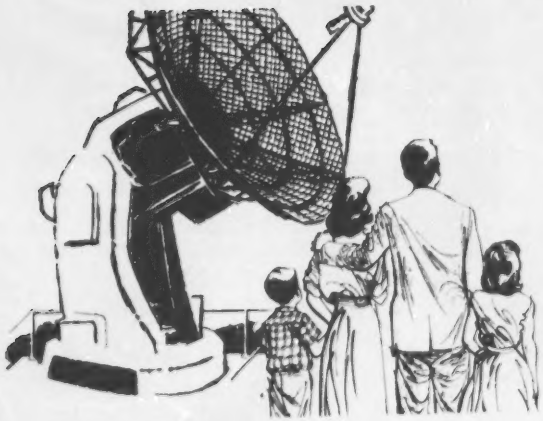
IV. Whole Numbers
(Level 2)

J. The learner divides by a divisor of two or more digits.

The adult class of sixteen learners plans to visit the observatory at the local university. The total transportation cost is $20.00. What will the trip cost each adult? ($1.25)

$20.00 total cost ÷ among 16 students =$1.25 each

$$
\begin{array}{r}
1.25 \\
16\overline{)\$20.00} \\
16 \\
\hline
40 \\
32 \\
\hline
80 \\
80 \\
\hline
\end{array}
$$



IV. Whole Numbers
(Level 2)

K. The learner rounds off given numbers to a specified place.

Observing a track meet on television, the learner rounds to the nearest second the times recorded in the 100 yard dash.

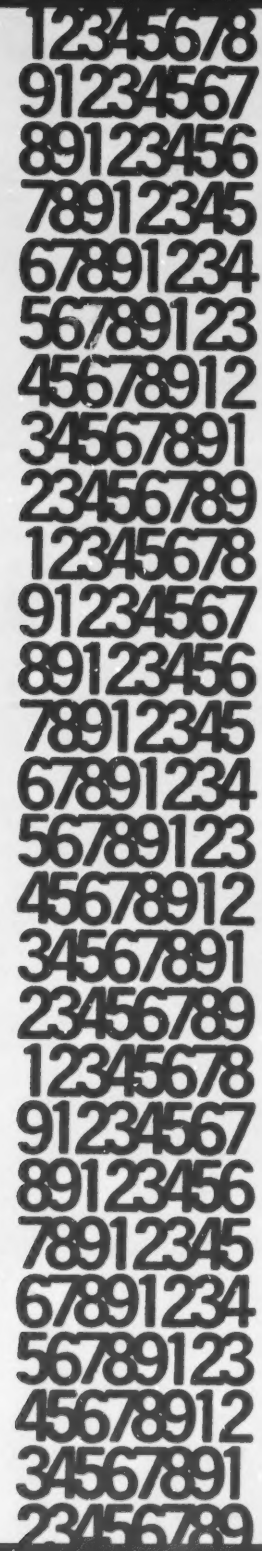
9.8 seconds = (10)
10.2 seconds = (10)
10.5 seconds = (11)

IV. Whole Numbers
(Level 2)

L. The learner estimates answers to problems.

The cost of 2½ pounds of seed at 39¢ a pound is a little more than a dollar or a little less than a dollar? (less)

Denominate Numbers



V. Denominate Numbers
(Level 1)

A. The learner recognizes relative value of U.S. coins.

The learner is presented coins representing five different fractional parts of a dollar. He will arrange the coins from the lowest value to the highest.

1¢ 5¢ 10¢ 25¢ 50¢

V. Denominate Numbers
(Level 1)

B. The learner counts U.S. coins and dollars.

He will count money and arrive at a total amount.

Sam has $5, $10, $3, two dimes, one quarter, one nickel and four pennies. What is the total amount he has in his billfold?

$10.00
5.00
3.00
.20
.25
.05
.04
($18.54)

V. Denominate Numbers (Level 1)

C. The learner makes change in amounts up to ten dollars.

The following situation is explained to the learner: Edna Kane bought items costing $1.65, $2.03, $3.14 and $.96. She handed the clerk a ten dollar bill. How much change did she receive? ($2.22)

$1.65	$10.00	
2.03	-7.78	
3.14	$ 2.22	change (two one-dollar bills, two dimes and two pennies)
.96		
$7.78		

V. Denominate Numbers
(Level 1)

D. The learner associates relative lengths of inches feet, and yards.

The learner is given a list of commonly used objects. He will determine the proper unit of measurement for each object.

1. Book =(inches)
2. Telephone pole = (feet or yards)
3. Sofa = (inches)
4. Pencil = (inches)
5. Car = (feet)
6. Football field = (yards)
7. Glass = (inches)
8. Golf Clubs = (inches or feet)

V. Denominate Numbers
(Level 1)

E. The learner recognizes standard units of capacity and their relative sizes.

The learner draws a ring around the number of ornaments needed to fill the half dozen carton, around the number of eggs needed to fill the dozen carton, and around the number of pints needed to fill a quart.

V. Denominate Numbers
(Level 1)

F. The learner identifies units of time (second, minute, hour, etc.)

With the aid of a clockface, the learner can express verbally the difference between seconds, minutes and hours.

The learner estimates the amount of time needed to do the following: sew on a button, stop at a traffic light, watch a movie.

length of time = duration

V. Denominate Numbers
(Level 1)

G. The learner determines the best unit of weight. (pounds, ounces, tons)

Presented with a list of items, the learner will estimate the approximate weight of each.

thimble = (ounce)
pair of shoes = (pound)
moving van truck = (ton)
hair net = (ounce)
console TV = (pounds)
refrigerator = (pounds)

V. Denominate Numbers (Level 2)

A. The learner uses the dollar sign and decimal point.

The learner writes the following amounts using the dollar sign and decimal point.

1 dollar and 25 cents ($1.25)

2 dollars and 50 cents ($2.50)

V. Denominate Numbers (Level 2)

B. The learner adds and subtracts amounts in dollars and cents.

The learner goes into a supermarket and selects the following items: one pound of margarine @ 69¢, a dozen eggs @ 55¢, a pound of hamburger @ 79¢, a box of detergent @ 79¢, and a loaf of bread @ 29¢. How much does he have to pay the cashier? ($3.11) How much change would he receive from a $5.00 bill?

$.69 margarine	$5.00
.55 eggs	3.11
.79 hamburger	$1.89 change
.79 detergent	
.29 bread	
$3.11 total amount to pay	

V. Denominate Numbers
(Level 2)

C. The learner multiplies and divides amounts in dollars and cents by whole numbers.

1. If facial tissues cost 29¢ a box, how much would 5 boxes cost?

   5 boxes @ 29¢ each = $1.45 the cost of five boxes

$$\begin{array}{r} \$.29 \\ \times\ 5 \\ \hline (\$1.45) \end{array}$$

2. Suppose you have $3.24 and want to divide it equally among each of your four children. How much will each child get?

   $3.24 ÷ 4 = ($.81)

$$\begin{array}{r} .81 \\ 4\overline{)\$3.24} \\ 32 \\ \hline 4 \\ 4 \\ \hline 0 \end{array}$$

V. Denominate Numbers
(Level 2)

D. The learner converts among units of measure.

Mrs. Rice went into a supermarket and bought four packages of meat. Weights were 10 ounces, 22 ounces, 14 ounces, and 5 ounces. How much was the total in ounces? in pounds? (51 ounces or 3 lb. 3 oz.)

10 oz.
22 oz.
14 oz.
5 oz.
(51 oz.)

3 lb. 3 oz.
16 oz.) 51 oz.
48
3 oz. remaining

V. Denominate Numbers
(Level 2)

E. The learner converts among units of time. (second, hour, day, month)

The learner completes each of the following:

3 hr. 10 min. = (190) min.
100 min. = (1) hr. (40) min.
80 sec. = (1) min. (20) sec.
3 yr. 6 mo. = (42) mo.
6 wk. 2 da. = (44) da.

V. Denominate Numbers
(Level 2)

F. The learner is introduced to the three basic units of the metric system -- meter, liter, gram.

Group discussion of the ways in which the learners have seen the metric system used -- e.g., 100 meter dash, cc. of medicine, 35 mm. film, weight of some packaged foods expressed in grams, speed limits expressed in km.

After converting to the metric system we will buy milk by the (liter), flooring will be sold by the square (meters), the weight of a box of crackers will be expressed in (grams).

V. Denominate Numbers
(Level 2)

G. The learner changes from metric unit to another metric unit.

1. The learner discusses with instructor commonly used prefixes listed below:

milli --- means thousandths
centi --- means hundredths
deci --- means tenths
deca (or deka)--means ten
hecto --- means hundred
kilo --- means thousand

In this way, one hundredth of a meter is named a centimeter, one tenth of a gram is a decigram, and one thousandth of a liter is a milliliter. On the other hand, ten liters equal one decaliter, and 1000 meters equal one kilometer.

2. After discussion, the learner gives the correct name for each of the following:

1/1000 of a meter	(millimeter)
1/100 of a liter	(centiliter)
1000 meters	(kilometer)
100 centigrams	(1 gram)

V. Denominate Numbers
(Level 2)

H. The learner converts English units to metric units and vice versa.

Metric to English Conversion Factors

1 centimeter = 0.39 inch
1 meter = 39.37 inches
1 kilometer = 0.62 mile
1 liter = 1.06 quarts

English to Metric Conversion Factors

1 inch = 2.54 centimeters
1 yard = 0.9 meter
1 mile = 1.6 kilometers
1 pound = 0.45 kilogram
1 quart = 0.94 liter

Assuming that the distance from the Learning Center to Automatic Electric is 5 miles, how far is this trip in kilometers? 5 x 1.6 = (8.0 km.)

I am ___ft. ___in. tall. This is ___in. My height in metric measurement is ___cm.

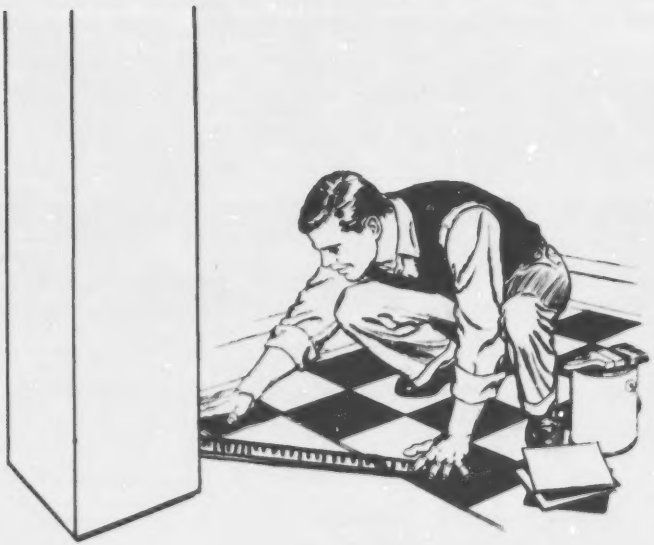
A person who weighs 135 lb. weighs only 60.75 kg! Don't you like the metric system better than our old system?

V. Denominate Numbers
(Level 2)

I. The learner is introduced to square units of measure.

The learner measures areas of desk tops and blackboards by placing a cardboard square foot on the surface and counting the number of times it will fit.

The learner discovers how many cardboard square feet it takes to cover a square yard.



V. Denominate Numbers
(Level 2)

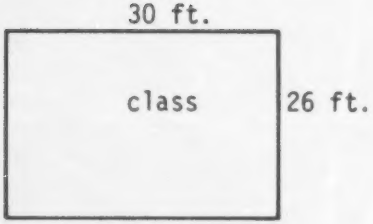
J. The learner converts square units to other square units.

The learner measures the length and width of the classroom in feet. Find the area in square feet. Convert the area to square yards.*

Example:

30 feet long
x26 feet wide
180
60
780 square feet

86 sq. yds. 6 sq. ft.
9) 780
72
60
54
6



*9 sq. ft. = 1 sq. yd.

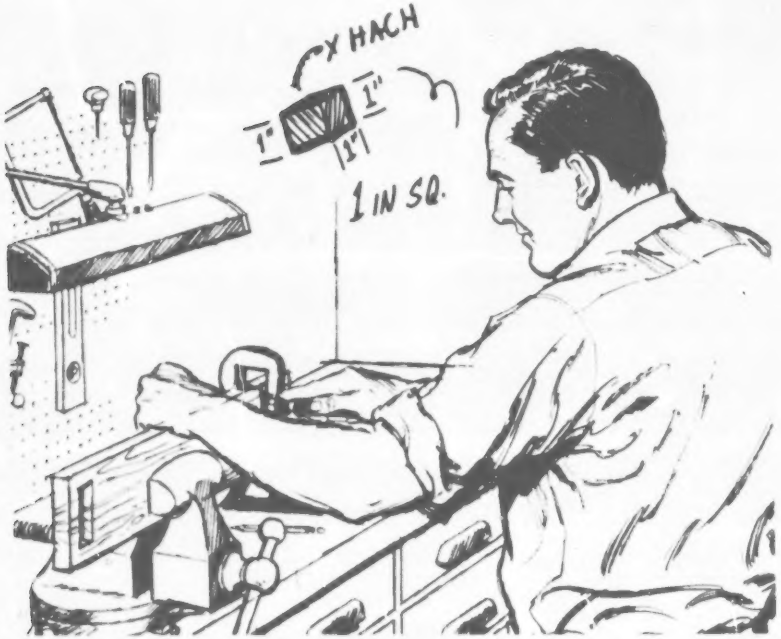
V. Denominate Numbers
(Level 2)

K. The learner is introduced to cubic units of measure.

The learner finds the volume of a box 3" by 4" by 5" by placing one-inch cubes in layers,

$3 \times 4 \times 5 =$

$(12) \times 5 = (60)$ cubic inches



V. Denominate Numbers
(Level 2)

L. The learner converts cubic units to other cubic units.

An excavation for a building is 150 feet long, 60 feet wide, and 45 feet deep. How many cubic yards of earth were removed?*

150' x 60' x 45' =

(9.000 x 45' = 405,000 cubic feet

$$27\overline{)405{,}000} \quad 15{,}000 \text{ cubic yards}$$

$$\begin{array}{r} 27 \\ \hline 135 \\ 135 \\ \hline \end{array}$$

* 27 cubic feet = 1 cubic yard

Fractions

12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789
12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789
12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789

VI. Fractions
(Level 1)

A. The learner is introduced to common fractions.

Given a fraction wheel with overlays representing 1/2's, 1/4's, and 1/8's, the learner places the overlays on the fraction wheel demonstrating an understanding of common fractions.

1 whole =

2 halves =

4 fourths =

8 eighths

VI. Fractions
(Level 1)

B. The learner identifies the numerators and denominators of common fractions.

Given a list of common fractions, the learner will identify the numerator by writing "N" by the number above the line and "D" by the number below the line.

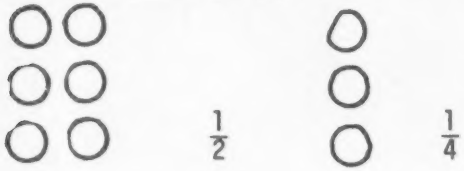
Examples: $\frac{2(?)\ (N)}{4(?)\ (D)}$ $\frac{4(?)\ (N)}{8(?)\ (D)}$ $\frac{3(?)\ (N)}{6(?)\ (D)}$ $\frac{5(?)\ (N)}{6(?)\ (D)}$

VI. Fractions
(Level 1)

C. The learner compares the relative values of unit fractions.

Using a pie chart and transparent overlays representing 1/2 and 1/4 of the pie chart, the learner places the 1/4 overlays on the 1/2 overlay and places both on the pie chart.

The learner determines which has greater value 1/2 or 1/4—by comparing one half dozen eggs (6) with one fourth dozen eggs (3).



$\frac{1}{2}$ $\frac{1}{4}$

VI. Fractions
(Level 1)

D. The learner is introduced to the concept of mixed numbers and improper fractions.

$$\frac{8}{3} = \frac{1}{3}\frac{1}{3}\frac{1}{3}\frac{1}{3}\frac{1}{3}\frac{1}{3}\frac{1}{3}\frac{1}{3} = \frac{8}{3}$$

Using the improper fraction 8/3, the learner divides the numerator, 8, by the denominator, 3, to find there are (2) wholes and the fraction (2/3). To change 12/5 to a mixed number, divide (12) by (5) to get (2 2/5). To change the following improper fractions to mixed numbers divide the numerator by the denominator.

$\frac{9}{8} = (1\ \frac{1}{8})$ $\frac{3}{2} = (1\ \frac{1}{2})$ $\frac{5}{2} = (2\ \frac{1}{2})$ $\frac{6}{4} = (1\ \frac{2}{4})$

$\frac{11}{5} = (2\frac{1}{5})$

VI. Fractions
(Level 1)

E. The learner distinguishes between proper and improper fractions.

Rule: A fraction whose numerator is larger than the denominator is called an improper fraction.

Example: $\frac{8}{3}$ $\frac{9}{5}$ $\frac{4}{3}$

Given a list of proper and improper fractions, the learner marks a "P" by the proper fraction and an "I" by the improper fractions.

$\frac{9}{7}$ (I) $\frac{3}{5}$ (P)

$\frac{4}{3}$ (I) $\frac{2}{3}$ (P)

VI. Fractions
(Level 1)

F. The learner changes whole numbers to fractions.

The learner refers to the blocks below and fills in the proper blanks.

$1 = \frac{?}{4}$ (4) $\qquad 2 = \frac{?}{4}$ (8) $\qquad 1 = \frac{?}{6}$ (6)

VI. Fractions
(Level 1)

G. The learner converts mixed numbers to improper fractions.

To change the mixed number 4 1/3 to an improper fraction, change the whole number to thirds and add the 1/3:

$$4 \times \frac{3}{3} = \frac{12}{3} \qquad 4\frac{1}{3} = 4 + \frac{1}{3} = \frac{12}{3} + \frac{1}{3} = \frac{13}{3}$$

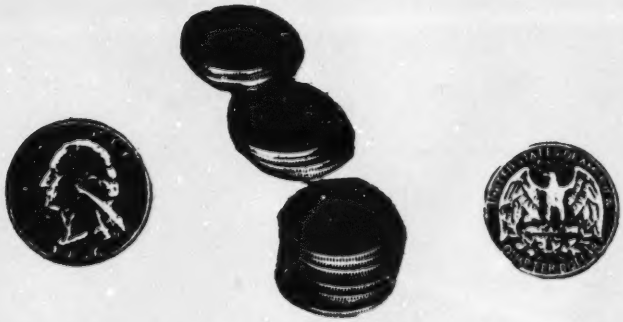
Find the answers for the following:

$1\frac{7}{8} = \frac{?}{8}$ (15) $\qquad 2\frac{1}{5} = \frac{?}{5}$ (11) $\qquad 3\frac{1}{2} = \frac{?}{2}$ (7)

VI. Fractions
(Level 1)

G. The learner converts improper fractions to mixed numbers and vice versa.

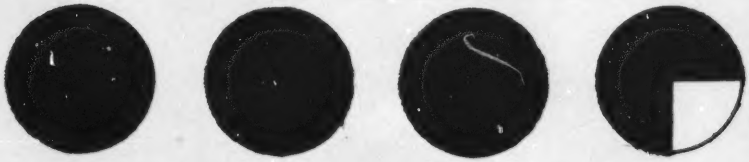
The learner groups 15 quarters in order to change to whole dollars and fractions. (mixed number)
$(3\frac{3}{4})$



VI. Fractions
(Level 1)

G. The learner converts mixed numbers to improper fractions.

Observe the circles below. See 3 3/4 discs. See that there are 4/4 in each whole disc. Observe that 4/4 = 1. Using the above circles, write how many shaded fourths are shown. $(\frac{15}{4})$



VI. Fractions
(Level 1)

H. The learner changes fractions to equivalent fractions.

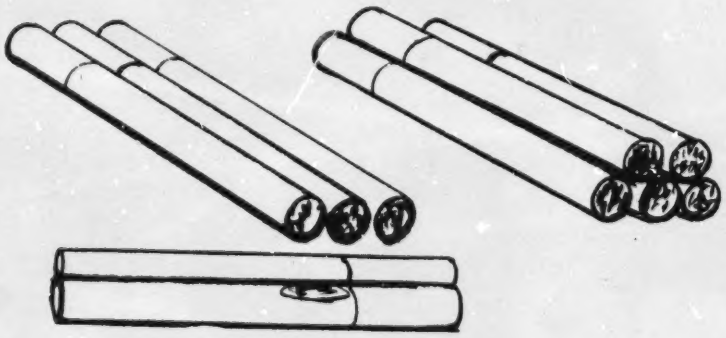
The learner changes fractions to equivalent fractions by multiplying both the numerator and denominator by the same number.

Example: $\frac{2}{3} = \frac{?}{9}\ (\frac{6}{9})$ $\frac{1}{2} = \frac{?}{32}\ (\frac{16}{32})$ $\frac{5}{8} = \frac{?}{32}\ (\frac{20}{32})$

VI. Fractions
(Level 1)

I. The learner simplifies fractions to lowest terms.

Using 1 package of cigarettes (could be varied using eggs, coke bottles, 6 or 8 cartons, etc.) the learner divides the 20 cigarettes into 4 equal piles. The learner writes how many piles are necessary to make the original pile. Answer should be 4 (each pile 1/4 of 20). The learner writes on paper the relationship of 5 to 20. (Help learner give fraction of 5/20). Remind learner he has already said 5 parts of 20 is 1/4 of 20. The learner will write how many 5's make 20. (Answer should be 4). The learner writes how many 5's in 5. (Answer should be 1). The learner writes any number that will go into both the top number (numerator) and the bottom number (denominator). Through this question and answer process the learner should be led to the correct answer and success.



VI. Fractions
(Level 1)

I. The learner simplifies fractions to lowest terms.

Using fractional cut-outs of twelfths, sixths, fourths, and thirds, the learner demonstrates other fractional names for 4/12, 3/12, 8/12, 9/12.

Simplify the following fractions by dividing the numerator and the denominator by 3:

$\frac{6}{12}$ $\frac{9}{12}$ $\frac{3}{12}$ $\frac{12}{15}$ $\frac{3}{6}$ $\frac{6}{18}$

$(\frac{2}{4})$ $(\frac{3}{4})$ $(\frac{1}{4})$ $(\frac{4}{5})$ $(\frac{1}{2})$ $(\frac{2}{6})$

VI. Fractions
(Level 2)

A. The learner adds fractions having common denominators.

1. The learner writes the sum of the following lengths of curtain material: 2/8 yd., 4/8 yd., 1/8 yd. How many yards of material will be needed in all? (7/8)

2. Some plywood is made by gluing together three thin pieces of wood whose thicknesses are 1/16 in., 3/16 in., and 4/16 in. What is the thickness of the plywood? (8/16 = 1/2)

1. $\frac{2}{8}$ yd. $\quad \frac{2}{8}$ yd. $+ \frac{4}{8}$ yd. $+ \frac{1}{8}$ yd. $= (\frac{7}{8}$ yd.)

$\frac{4}{8}$ yd.

$+ \frac{1}{8}$ yd.

$(\frac{7}{8}$ yd.)

2. $\frac{1}{16}$ in.

$\frac{3}{16}$ in.

$+ \frac{4}{16}$ in.

$(\frac{8}{16}$ in.) or $(\frac{1}{2})$

VI. Fractions
(Level 2)

B. The learner subtracts fractions having common denominators.

Using three rectangular regions with some parts shaded, the learner writes the fractions under each rectangular region which shows what part of the rectangle is shaded.

Example 1

$$\frac{3}{4} - \frac{1}{4} = \left(\frac{2}{4}\right)$$

Examples: $\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ or $\frac{1}{2}$

Rule: We can only subtract numerators* since numerators represent the value of the fractional part which exists in the whole.

Example 2 $\frac{7}{8} - \frac{4}{8} = \left(\frac{3}{8}\right)$

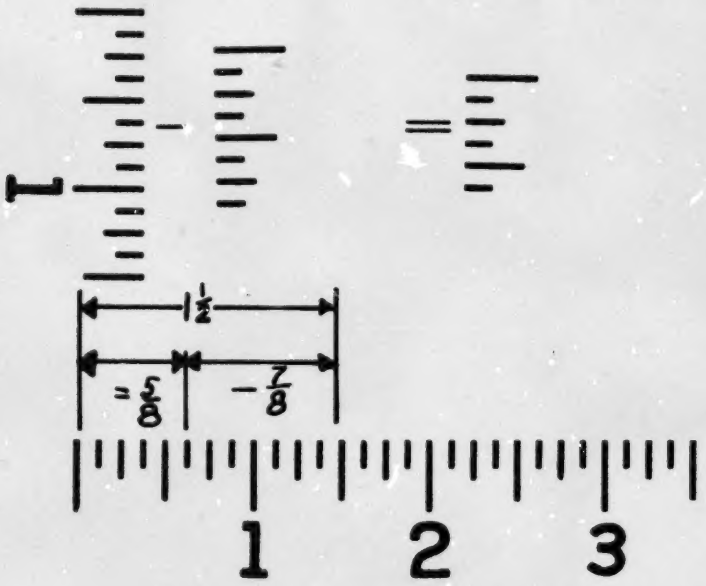
$$\begin{array}{r} \frac{7}{8} \\ -\frac{4}{8} \\ \hline \left(\frac{3}{8}\right) \end{array}$$

* $\frac{7}{8}$ numerator
denominator

VI. Fractions
(Level 2)

C. The learner subtracts fractions having common denominators and requiring borrowing.

Using a ruler, the learner subtracts $\frac{7}{8}$ inches from $1\frac{1}{2}$ inches ($\frac{5}{8}$).



VI. Fractions
(Level 2)

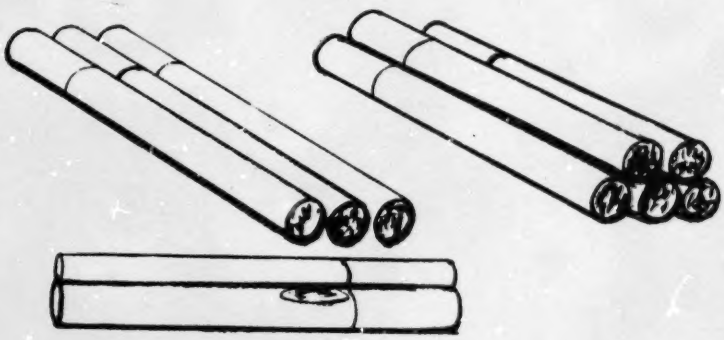
D. The learner finds the least common denominator (L.C.D.) for given fractions.

Using at least 20 cigarettes i.e. 1/4 or 5; 1/2 or 10; 3/5 or 12; etc., show each is a fractional part of 20. 20 is the L.C.D. To show the fractional parts of the number 20, the learner will have 20 cigarettes and can explain that 5 of them is 1/4 of the 20. He can show that 10 of the cigarettes is 1/2 of the total 20. He can show that 12 cigarettes is 12/20 or 3/5 of the total.

L.C.D. = 20

$$\frac{1}{4} = \frac{5}{20}$$
$$\frac{1}{2} = \frac{10}{20}$$
$$+\ \frac{3}{5} = \frac{12}{20}$$
$$\left(\frac{27}{20}\right) \text{ or } \left(1\ \frac{7}{20}\right)$$

Least Common Denominator = L.C.D.



VI. Fractions
(Level 2)

E. The learner adds fractions with unlike denominators after finding the L.C.D.

Using a table of equivalent fractions, find the sums of the following fractions.

$\frac{1}{4} + \frac{1}{2} = (\frac{3}{4})$ $\frac{1}{4} + \frac{2}{3} = (\frac{11}{12})$

$\frac{1}{8} + \frac{3}{4} = (\frac{7}{8})$ $\frac{1}{6} + \frac{2}{3} = (\frac{5}{6})$

Example:

$\frac{1}{4}$ + $\frac{1}{2}$ =

$\frac{1}{4}$ + $\frac{2}{4}$ = $\frac{3}{4}$

VI. Fractions
(Level 2)

E. Adding fractions with unlike denominators after finding the L.C.D.

The learner writes the sum of the total thickness of a board 5/8 " covered with a layer of formica 1/16" thick.

$$\begin{array}{r} \frac{5}{8}" = \frac{\quad}{16}" \\ +\ \frac{1}{16}" = \frac{\quad}{16}" \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{8}" = \frac{10}{16}" \\ +\ \frac{1}{16}" = \frac{1}{16}" \\ \hline \frac{11}{16}" \end{array}$$

Least Common Denominator (L.C.D.) = (16)

VI. Fractions
(Level 2)

F. The learner subtracts fractions with unlike denominators after finding the L.C.D.

The learner measures and writes the difference between two boards 7/8" thick and 3/4" thick. (3)

Rule: The learner must remember before subtracting, he must change the fraction to equivalent fractions having the same denominator.

$$\begin{array}{r} \frac{7}{8}" = \ __" \\ -\ \frac{3}{4}" = \ __" \\ \hline \end{array} \qquad \begin{array}{r} \frac{7}{8}" = \frac{7}{8}" \\ -\ \frac{3}{4}" = \frac{6}{8}" \\ \hline (\frac{1}{8}") \end{array}$$

Least Common Denominator (L.C.D.) = 8

VI. Fractions
(Level 2)

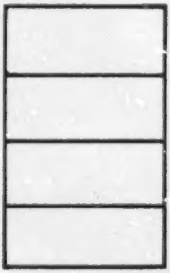
G. The learner multiplies two proper fractions.

Using a rectangular piece of paper and crayons, the learner will follow directions below, then write the product of 2/3 x 3/4 =( ).

1. Fold the paper into thirds and color 2 of the sections yellow.

2. Fold the paper into fourths and color 3 of the sections red. Color over the yellow when necessary.

3. Write the fractional part of the paper that is colored red & yellow (orange). (6/12)



VI. Fractions
(Level 2)

H. The learner multiplies whole numbers and fractions or mixed numbers and fractions.

The learner will find 2/3 of 3" by using the ruler and by multiplying 3 1/2" x 21.

Example: $\frac{2}{3}$ of 3 $\quad \frac{2}{3} \times 3 = 2 \quad \frac{2}{3} \times 3 = \frac{2}{3} \times \frac{3}{1} = \frac{6}{3} = (2)"$

$3\frac{1}{2} \times 21 = 3\frac{1}{2} \times \frac{21}{1} = \frac{7}{2} \times \frac{21}{1} = 7 \times \frac{21}{2} \times 1 = \frac{147}{2} = (73\frac{1}{2})$

VI. Fractions
(Level 2)

I. The learner reduces fractions by cancelling before multiplying.

Using fractional cut-outs of eights, the learner groups them into 4/8 and 4/3, removes two of the eights (2/8 = 1/4) and writes the product using cancellation before multiplication.

Example: $\frac{4}{8} \times \frac{1}{4} = \frac{\cancel{4}}{\cancel{8}} \times \frac{\cancel{1}}{\cancel{4}} = (\frac{1}{8})$ $\frac{4}{8} \times \frac{1}{4} = \frac{4}{8} \quad \frac{1}{4} = (\frac{1}{8})$

VI. Fractions
(Level 2)

J. The learner divides fractions by fractions.

Using a number line, the learner demonstrates the following:

$$\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} = 2$$

VI. Fractions
(Level 2)

K. The learner divides whole numbers by fractions and divides fractions by whole numbers.

Using a string that is 4 yards long, cut it into 6 pieces that are 2/3 yards long. This will demonstrate

$$4 \div \frac{2}{3} = (6)$$

Activity: Mark with a pencil the six sections of three rectangles. Cut out the sections. Count out 15 of these sections (15/6). Separate into 3 equal piles. Place so that each pile is similar to the original rectangle.

$\frac{5}{6}$ $\frac{5}{6}$ $\frac{5}{6}$

$$\frac{15}{6} \div 3 = (\frac{5}{6})$$

111

VI. Fractions
(Level 2)

L. The learner expresses remainders in division problems as fractions.

Using 10 packages of gum, place all 50 sticks (or toothpicks) together. The learner takes away 13 leaving 37 sticks. Ask the learner how many packages of 5 sticks can be made from the 37 sticks. Have the learner separate the 37 sticks into stacks of 5 which would give 7 stacks and 2 sticks of another package of 5 left. Express the remainder in numerical terms as $\frac{2}{5}$.

VI. Fractions
(Level 2)

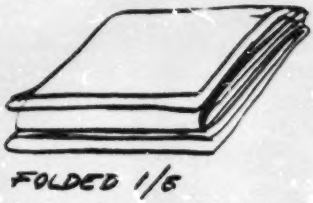
M. The learner compares the values of common fractions.

These pictures show ways in which sheets of paper can be folded in order to illustrate the value of fractions.

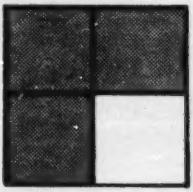
folded into halves

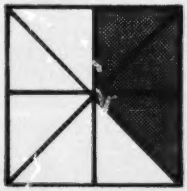
folded into fourths

folded into eighths



three-fourths shaded compared to three-eighths shaded





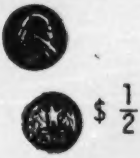
By folding paper the learner shows that; 3/8 is less than 1/2; 5/8 is greater than 1/2; 4/8 is equal to 1/2.

VI. Fractions
(Level 2)

M. The learner compares the value of common fractions.

Jerry has $1/2 ($.50). Joe has $1/4 ($.25). The learner shows by comparison who has more.

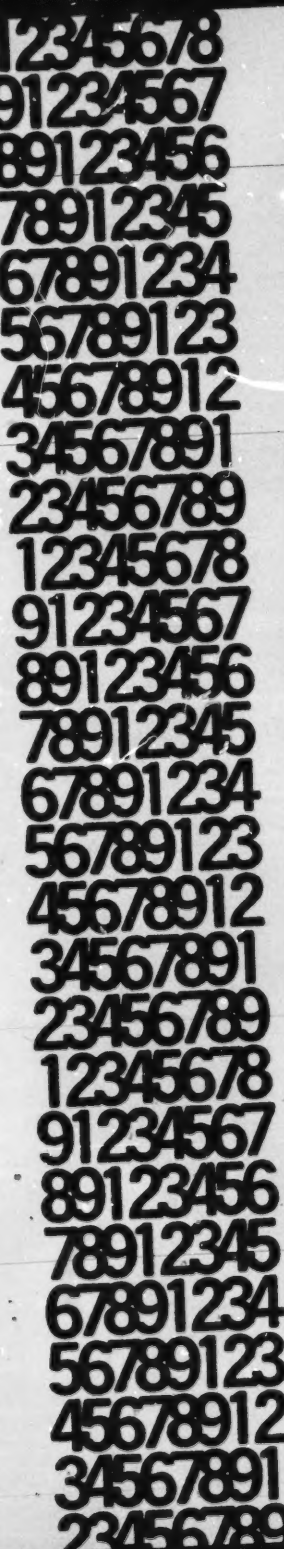
$\$\frac{1}{4}$



$\$\frac{1}{2}$

Rule: Fractions can be compared only when they have common denominators.

Decimals


12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789
12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789
12345678
91234567
89123456
78912345
67891234
56789123
45678912
34567891
23456789

VII. Decimals
(Level 1)

A. The learner reads and writes decimals.

The teacher explains the decimal system and place value to the learner. Using the following examples, the learner reads the following decimals to the teacher: .7, .5, .25, .65, .758 and writes the following decimals which are dictated by the teacher: .3, .6, .35, .75, .235

Rule: A decimal point has no place value of its own. It is only a signal which tells where a whole number ends and where a decimal fraction begins, such that the numeral 5,234.671 can be balanced around the ones place, indicating multiples of 10's to the left and 1/10 the value to the right.

thousands	hundreds	tens	ones		tenths	hundredths	thousandths
5	2	3	4	.	6	7	1

VII. Decimals
(Level 1)

B. The learner adds, using decimals.

The learner writes the length of the sides of a triangle in vertical form and adds to find the distance around the triangle.

VII. Decimals
(Level 1)

A. The learner reads and writes decimals.

Using the following examples, the learner reads the following decimals to the teacher: .7, .5, .25, .65, .758 and writes the following decimals which are dictated by the teacher: .3, .6, .35, .75, .235

Rule: A decimal point has no place value of its own. It is only a signal which tells where a whole number ends and where a decimal fraction begins, e.g., the numeral 5,234.671 can be balanced around the one's place, indicating multiples of 10's to the left and 1/10 the value to the right.

5,234.671

Rule: Remember to line up your decimals.

$$\begin{array}{r} 3.5 \text{ in.} \\ 3.2 \text{ in.} \\ 2.7 \text{ in.} \\ \hline (9.4 \text{ in.}) \end{array}$$

In example 2, write the problem in vertical form and add. 2.341 + 4.426 + .002

$$\begin{array}{r} 2.341 \\ 4.426 \\ .002 \\ \hline (6.769) \end{array}$$

VII. Decimals
(Level 1)

C. The learner subtracts, using decimals.

Using play money and/or pennies, the learner subtracts to find the remainder in the following problem: \$5.45 - \$2.26 (\$3.19). The learner will form other problems.

$$\begin{array}{r} \$5.45 \\ -2.26 \\ \hline (\$3.19) \end{array}$$

VII. Decimals
(Level 2)

A. The learner compares decimals.

The learner compares decimals by adding zero(s) after the number so both numbers contain the same number of decimal places. The largest number is the larger decimal.

Example one: Using a micrometer the learner shows a comparison.

1. Which is larger? .03 or .3
   .03 = .03
   .3 = .30
   .3 is larger

Micrometer reading .258 of an inch

A mixed decimal or whole number is larger than a decimal fraction. (1.4) or (4.) (.4)

118

VII. Decimals
(Level 2)

B. The learner multiplies decimals.

By counting from the right, mark off as many decimal places in the product as are found in the two factors of the problem (multiplier and multiplicand).

1. Fresh water weighs approximately 62.5 pounds per cubic foot. Ice weighs .92 times as much as water. The learner finds the weight of a cubic foot of ice. 62.5 x .92 = (57.5)

$$\begin{array}{r} 62.5 \\ \times\ .92 \quad \text{3 places} \\ \hline 1250 \\ 5625 \\ \hline 57.500 \quad \text{(count over three places)} \end{array}$$

2. C.W. Dillard is a bricklayer and receives $3.25 an hour. He works 40 hours per week. What are his weekly earnings? ($130.00) (Have each member of the class compute his weekly or monthly earnings.)

VII. Decimals
(Level 2)

C. The learner divides decimals by whole numbers.

Using $.30 (30 pennies), ask that money be broken (divided) into equal amounts for 3 learners. The learner makes 3 separate stacks of money. Extend the exercise by varying the amounts.

VII. Decimals
(Level 2)

D. The learner divides decimals by decimals.

Explain the process of regrouping decimals in the divisor and dividend*. Using $2.50, the learner determines how many dimes he used to dry his clothes at the laundromat.

```
          25 dimes
.10) $2.50
     2 0
     ---
       50
       50
       --
```

*divisor) quotient / dividend

120

VII. Decimals
(Level 2)

E. The learner converts fractions to decimals.

Given a fraction, the learner divides denominator into the numerator to convert fraction to decimal.

Example: $\frac{1}{4}$

$$4\overline{)1.00}\quad 25$$

$$\begin{array}{r} 8 \\ \hline 20 \\ 20 \\ \hline \end{array}$$

VII. Decimals
(Level 2)

F. The learner is introduced to percentage.

Using 100 pennies (one dollar is divided into 100 equal parts and one penny is 1% of the dollar.) the learner writes what percent of one dollar 10 of the pennies would be (extend by varying amounts). (10%) By percentage we mean by the hundred. 10% means 10% of 100.

Example:

$$\begin{array}{r} 100 \text{ pennies} \\ \times .10 \\ \hline (10.00) \text{ pennies} \end{array}$$

VII. Decimals
(Level 2)

G. The learner changes percents to decimal fractions.

Given: Each learner spends approximately 22% of his annual income on rent. The learner computes the amount of rent he pays based upon his annual income.

Example: $6000 x .22 = $1320.00 rent paid annually

yearly income $6000.00
.22 percent
1200000
1200000
$1320.00 pays for rent

$6000 income
1320 rent
$4680 balance left for other expenditures

122

VII. Decimals
(Level 2)

H. The learner changes decimal fractions to percent.

Example: Baseball averages. A baseball club played 60 games and won 45. What was the winning percentage?

Solution: 45/60

$$60\overline{)45.00} = .75$$

$$\begin{array}{r} 42\ 0 \\ \hline 3\ 00 \\ 3\ 00 \\ \hline \end{array}$$

.75 decimal 75% (percent)

VII. Decimals
(Level 2)

I. The learner changes percents to common fractions.

If Mr. Wilson pays 25% down on a house, what part of the purchase price is his down payment?

Solution: $25\% = .25 = \frac{25}{100} = \frac{1}{4}$

For example, the house cost \$8000.00 and 25% or $\frac{1}{4}$ of \$8000.00 =

$$\begin{array}{r} 8000 \\ \times .25 \\ \hline 40000 \\ 16000 \\ \hline \$2000.00 \end{array}$$

$\frac{1}{4} \times \frac{8000}{1}$ = \$2000 down payment

VII. Decimals
(Level 2)

J. The learner changes common fractions to percents.

Using play money, the learner writes the fractional value of one quarter, representing this with the quarter and with the pennies. (one quarter = 1/4 of the dollar. One fourth of a dollar = 25 pennies or .25 = 25%)

quarters solution

1 quarter
4 quarters

$$4\overline{)1.00} = .25 = 25\%$$
8
20
20

pennies solution

$$100\overline{)25.00} = .25 = 25\%$$
20 0
5 00
5 00

VII. Decimals
(Level 2)

K. The learner recognizes fractional equivalents for frequently used percents.

The learner recognizes the fractional equivalents of:

75% ($\frac{3}{4}$) 50% ($\frac{1}{2}$) 25% ($\frac{1}{4}$) 33 $\frac{1}{3}$% ($\frac{1}{3}$) 16 $\frac{2}{3}$% ($\frac{1}{6}$)

12 $\frac{1}{2}$% ($\frac{1}{8}$) 20% ($\frac{1}{5}$)

VII. Decimals
(Level 2)

L. The learner finds percent of a given number.

What percent of a discount was allowed if the original cost of the camera was $56.00 with an $8.40 discount requiring a payment of $45.60?

$$
\begin{array}{r}
.15 \\
56\overline{)\,8.40} \\
\underline{5\;6} \\
2\;80 \\
\underline{2\;80}
\end{array}
\qquad \frac{15}{100} = 15\%
$$

VII. Decimals
(Level 2)

M. The learner computes what percent one quantity is of another.

Mr. Jones saves $25.00 each month. If his monthly income is $400.00, what percent of his monthly salary does he save?

Solution:
$$\begin{array}{r} .0625 \\ 400\overline{)\$25.0000} \\ 24\ 00 \\ \hline 1\ 000 \\ 800 \\ \hline 2000 \\ 2000 \\ \hline \end{array}$$

$.0625 = 6.25\%$ or $6\frac{1}{4}\%$

VII. Decimals
(Level 2)

N. The learner computes a number when a percent of it is given.

Example: If there are 10 learners present at an ABE class and this is 50% of the total number enrolled, how many learners are enrolled?

$$\begin{array}{r} 20 \text{ learners enrolled} \\ .50\overline{)10.00} \\ 10\ 0 \\ \hline 0 \\ 0 \\ \hline \end{array}$$

VII. Decimals
(Level 2)

O. The learner computes the percent of increase and decrease.

(A) The learner's social security check of $125.00 is increased to $150.00. How much is the percent of increase?

(B) At the same time, the price of bacon goes from 90¢ per pound to 75¢ per pound. What is the percent of decrease?

(A) ($\frac{150}{125} = \frac{6}{5} = 1\frac{1}{5} = \frac{1}{5}$ increase = 20%)

(B) 90 = old amount $\frac{75}{15}$ = new amount $\frac{15}{90} = \frac{1}{6}$ or $16\frac{2}{3}\%$
= decrease

(A) Increase Solution: $150 - $125 = $25 amount of increase

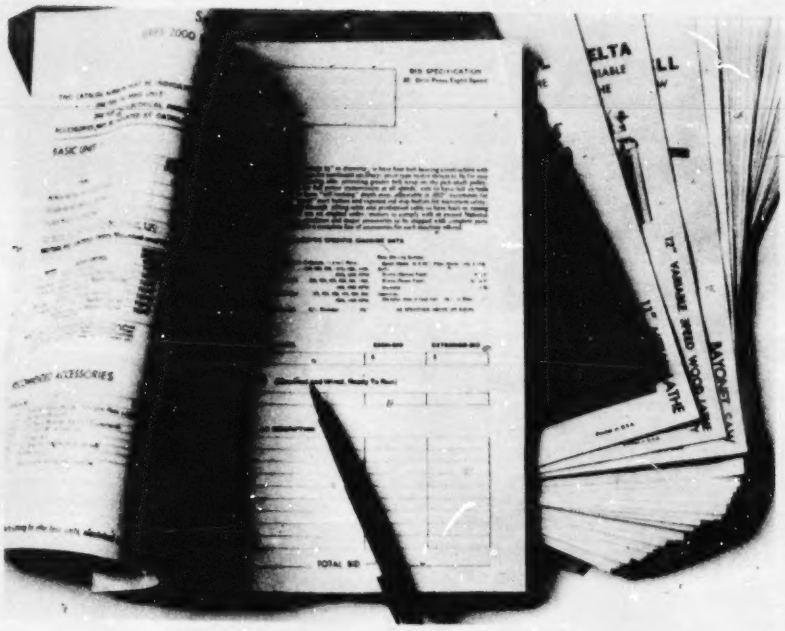
$$\begin{array}{r} .20 \\ 125\overline{)\,25.00} \\ \underline{25\;0} \\ 0 \\ \underline{0} \end{array}$$

.20 = 20% percent of increase

(B) Decrease Solution: 90¢ - 75¢ = 15¢ amount of decrease

$$\begin{array}{r} .166 \\ 90\overline{)\,15.000} \\ \underline{9\;0} \\ 6\;00 \\ \underline{5\;40} \\ 600 \\ \underline{540} \\ 60 \end{array}$$

.166 = 16.6% or $16\frac{60}{90}\%$ or $16\frac{2}{3}\%$



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